Generating Alternative Solutions when Depression is the Problem

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GENERATING ALTERNATIVE SOLUTIONS WHEN DEPRESSION IS THE PROBLEM

by

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ABSTRACT
GENERATING ALTERNATIVE SOLUTIONS
WHEN DEPRESSION IS THE PROBLEM

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Generating alternative solutions for problem situations is a key component of effective problem solving. This process is used to generate a variety of potential options for managing a problem, from which the most effective approach or combination of approaches can be selected for implementation. Impaired alternatives generation provides fewer options from which to select a response, reducing the likelihood that a highly effective approach will be available for implementation, potentially leaving problems unresolved, generating additional problems, and fostering a sense of hopelessness and depression. Depression has been found to impair problem solving further by reducing engagement in the problem solving process, subsequently creating a self-reinforcing cycle of distress. Seeking ways to interrupt this cycle, researchers have investigated generating alternatives for problem situations that may be contributing to depression, then using those alternatives to effectively resolve the contributing stressor. However, use of depression as the problem situation for generating alternatives is absent in the literature. The purpose of the current study was to examine the process of generating solutions using depression as the contributing problem. A systematic literature review was conducted. Based on the literature, two avenues of investigation were explored: whether generating alternatives for depression would be related to the same variables as other problem situations; whether gender effects or problem labeling would influence alternatives generation. A total of 578 undergraduate university students recruited from a psychology participant pool completed the study. Participants completed vignette-based measures of alternatives generation, questions about familiarity and self-efficacy related to situations in the vignettes, verbal fluency and ideation fluency measures, and self-report measures of depression and problem orientation. Results of correlation analyses indicated a moderate positive relationship between alternative generation measures and ideation fluency and weak positive relationships with measures of verbal fluency. Group comparisons identified a statistically significant three-way interaction effect between vignette situation, problem labeling, and vignette protagonist gender on total alternatives generated. Statistically significant two-way interactions between vignette situation and participant gender were found for both total alternatives generated and quantity of good alternatives generated. Results were interpreted in the context of problem-solving literature and recommendations for future research were presented.

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Generating Alternative Solutions when Depression is the Problem

Major depression is one of the most common mental illnesses in the United States, often resulting in serious impairment and disability. According to a nationwide survey conducted by the Substance Abuse and Mental Health Services Administration (SAMHSA; 2019) an estimated 17.7 million adults (7.2% of adult population) in the United States experienced at least one major depressive disorder during 2018. Of these individuals, 11.5 million (4.7% of adult population) experienced severe impairment in their ability to manage social, personal, or vocational responsibilities due to their depression. These rates were nearly double in young adults aged 18-25 years old, with 13.8% (4.6 million) of these individuals estimated to have experienced a major depressive disorder, 8.9% (3.0 million) with severe impairment.

Depression is diagnosed by the presence of low mood or anhedonia accompanied by a variety of other symptoms such as weight fluctuations, sleep disturbance, thoughts of worthlessness, fatigue, memory impairment, or difficulty concentrating (American Psychiatric Association [APA], 2013). Furthermore, individuals with depression often demonstrate rigid and pessimistic thought patterns, particularly regarding how they attribute blame for negative events. It can be common for these individuals to believe that negative events arise as consequences of their own faults, which they believe cannot be changed, and will henceforth negatively influence every situation they encounter (Seligman et al., 1979).

This pessimistic pattern of thinking can contribute to a self-reinforcing interaction between maladaptive thoughts and behaviors that serve to maintain a sense of hopelessness. The expectation that situations will result in unwanted outcomes, no matter

one's efforts, results in low motivation to attempt effective navigation of the situation. Even with motivation, the cognitive impairments common with depression can make it difficult to engage in developing effective strategies for managing problems. Ineffective attempts to manage challenging situations, whether due to lack of engagement or impaired planning, increase the likelihood of undesirable consequences. These unwanted outcomes serve to reinforce the beliefs that the consequences resulted due to personal shortcomings and therefore challenges cannot be effectively managed and should be feared, effectively continuing the cycle (Nezu et al., 2013).

Problem-Solving Therapy is a psychotherapeutic intervention designed to interrupt this maladaptive pattern. The primary foci of PST include improving problem orientation (e.g. self-efficacy regarding ability to manage problems) and developing effective problem-solving skills. Improvement of problem orientation occurs through development of a more balanced perspective of one's ability to manage stressors, and developing coping skills to manage emotional responses that would otherwise interfere with engaging in effective problem solving, such as fear-based avoidance. Specific problem-solving skills are presented in a structured, systematic framework. Stressors contributing to depression-related distress are identified and targeted during the process of developing these skills. As problem-solving skills are developed and effectively utilized the likelihood of desirable outcomes increases. These positive outcomes provide evidence of the ability to effectively manage challenges, improving problem orientation and reducing hopelessness, while also resolving stressors or reducing their impact and similarly reducing overall distress (Nezu et al., 2013).

A key component of this problem-solving approach is generating alternative solutions for managing the targeted stressor. This skill provides individuals with a variety of potential solutions from which they can select the approach most likely to result in positive outcomes (Nezu et al., 2013). However, depression can negatively influence generation ability due to difficulties engaging with this process (D'Zurilla & Sheedy, 1991; Marx et al., 1992; Nezu et al., 2013; Nezu & Ronan, 1987; Noreen et al., 2015). Generating a limited quantity of solutions may not be sufficient for producing a highly effective solution. Selection and implementation of a less-than-ideal solution is likely to either leave a problem unresolved or result in new problems, contributing to the maladaptive cycle previously described. In contrast, when more alternatives are generated, the likelihood of generating a highly effective solution is increased, or the wealth of alternatives allows for a greater number of good solutions to be implemented simultaneously. The expected result is improved outcomes, reduced stressors, and reduced distress (Nezu et al., 2013).

Problem solving therapy and research of alternatives generation target problems that may be contributing to depression, such as interpersonal conflicts or financial difficulties (e.g. Butler & Scherer, 1997). Therefore, in these approaches, depression is considered an outcome that can be affected through improvements in the problem-solving process and management of stressors. However, as previously noted, depression is not only an outcome of a maladaptive problem-solving process but also a contributor to this process. Can depression be utilized as the target problem situation in the solution generation process? To the best of this author's knowledge, no prior research had explored this question at the time of this writing.

The purpose of the current study was to examine the process of generating solutions using depression as the contributing problem. To achieve this goal, the following avenues of inquiry were persued:

- Evaluate relationships between measures of alternatives generation and variables identified in the literature to be associated with alternatives generation
- Explore group comparisons based on factors expected to influence alternatives generation

Results from this study could have implications for clinical practice and interventions for depression. First, outcomes could support the proposition that depression as a valid target of the solution generation process, and a first-step toward validation within a broader problem-solving framework. Second, outcomes could identify specific targets for improving alternatives generation, including problem orientation, problem familiarity, and general generation ability. Ultimately, it is hoped that the information provided in the course of this study might help inform the understanding and treatment of depression.

Literature Review

Methods

A systematic literature review was performed using the PsycINFO database. Primary search terms included “problem solving” and “generating alternatives.” Synonymous terms were identified and substituted as appropriate including “social problem solving,” “alternative generation,” “solution generation,” and “option generation.”

Peer-reviewed journal articles with relevant titles were flagged and abstracts read in order to identify articles associated with the review topic. Only articles printed in English were reviewed. Given the rapid development of executive function ability related to problem-solving skills during late childhood and early adolescence (Anderson, Anderson, Northam, Jacobs, & Catroppa, 2001; Mann, Harmoni, & Power, 1989), only research with adult participants was reviewed. Reference lists of selected articles were reviewed for additional sources related to the topic of this review.

Electronic copies of book volumes or chapters were located and obtained through the Marquette University library system. Hard copies were found at or ordered through the Marquette University library if electronic copies could not be obtained.

Glossary of Terms

Problem

A "problem" is defined as any current or anticipated life situation that requires an adaptive response to prevent or reduce undesirable consequences and maximize desired outcomes. These are situations where an effective response is not immediately apparent or available (Nezu et al., 2013).

Problem Solving

For the purposes of this review, "problem solving" and "social problem solving" are defined as "the self-directed process by which individuals attempt to identify, discover, and/or develop adaptive coping solutions for problems, both acute and chronic, that they encounter in everyday living" (Nezu et al., 2013, p. 8). The term "social problem solving" is commonly found in the clinical psychology literature to emphasize problem solving used to enhance adaptive functioning in everyday living. This distinction

is meant to differentiate this problem-solving approach from problem solving that does not occur within an interpersonal or social context, such as solving a math problem (D'Zurilla, Nezu, & Maydeu-Olivares, 2004).

Solution

A solution is a situation-specific response to a problem situation that is produced during the problem solving process (Nezu et al., 2013). Given that problem solving is defined as a deliberate process requiring awareness of available solutions for implementation, potential alternatives that are left unidentified are not considered solutions.

Idea Generation or Brainstorming

Brainstorming is a broad term that generally refers to the process of generating ideas. Brainstorming was a focus of much research in the 1960's and provided the foundation for later conceptualizations of idea generation (Osborn, 1963; Parnes, 1967; Nezu et al., 1989).

Alternatives Generation

The term "alternatives generation" can be found in the literature referring to nearly any process of generating multiple options in a situation (e.g. idea generation, hypothesis generation, option generation, etc.). However, it is used in this review as a synonymous term for solution generation given the frequent use of this term in social problem solving research.

Solution Generation

The terms "solution generation" and "alternatives generation" are most commonly utilized when discussing the social problem solving process. They refer to the deliberate

process of identifying options for solving or coping with an identified problem situation (Nezu et al., 1989). Synonymous terms include various combinations of these terms (e.g. "generating alternatives," "generation of alternative solutions," etc.).

Option Generation

In the cognition literature, "option generation" has been proposed as an operationalized term defined as the "formation of mental representations of candidates for goal-directed action" (Kalis et al., 2013, p. 4). This definition clearly identifies the process of generating means to an end. The generation of ideas unrelated to future action (e.g. hypothesis generation) is not included within this definition. In addition, habitual or automatic situational responses are not included in this definition as they do not include a deliberate formation of options. It should be noted that the process of option generation is mostly congruent with the concept of solution generation; however, an important distinction does exist. Solution generation is focused on developing alternatives for responding to a problem situation, whereas option generation is used to develop alternatives for *any* goal-directed action and not constrained to managing a problem.

Conceptualization of Alternatives Generation

To best develop a conceptualization of alternatives generation within a problem-solving framework, it is important to begin with a description of the theoretical underpinnings of the problem-solving model and a more robust description of the problem-solving process as it relates to distress.

Social Learning Theory

The conceptualization of social problem solving was developed from a social-learning perspective. Social-learning theory states that behaviors (and psychological

symptoms) develop through a learning process and are strengthened or weakened by environmental reinforcement. Therefore, adaptive behavior is typically learned through teaching and reinforcement of socially-desirable behaviors and punishment, shaping, or non-reinforcement of undesirable behavior. Persistent maladaptive behaviors arise from a learning history that was ineffective at teaching and reinforcing adaptive behavior. Environmental consequences (such as social criticism) in response to maladaptive behavior are likely to result in distress (D'Zurilla & Goldfried, 1971). Without the learning models or effective skills to develop more adaptive behaviors, maladaptive behaviors will not change (D'Zurilla & Goldfried, 1971).

D'Zurilla and Goldfried's Model of Problem-Solving

D'Zurilla and Goldfried (1971) suggested that problem-solving ability and its relationship to distress fit within a social-learning model. They stated that problem-solving approaches were typically learned through environmental forces. Effective problem solving was often rewarded with maximized positive outcomes or minimized negative outcomes, including reduced distress. In contrast, ineffective problem solving would often result in larger or new problems and emotional distress, ideally prompting use of a trial-and-error method to identify and implement a different, more adaptive approach. According to D'Zurilla and Goldfried (1971), a breakdown in problem-solving performance would result in an inability to generate new approaches, repeated maladaptive behavior, unwanted consequences, and distress.

D'Zurilla and Goldfried (1971) identified five components of problem-solving: a general orientation to approaching problem situations, problem definition, generation of alternatives, decision making, and verification. These were renamed and condensed in the

modern model of problem-solving to problem orientation and problem-solving style (Nezu et al., 2013). Problem orientation refers to an individual's attitudes toward problem situations. An individual with a positive problem orientation views problems as solvable, as a natural part of life, and believes in their ability to effectively solve problems. Those with a negative problem orientation view problems as threatening, unsolvable, distressing, and doubt their ability to effectively deal with such situations. Individuals with a negative problem orientation are more likely to engage in ineffective problem-solving styles such as avoiding problems or impulsively implementing solutions (Nezu et al., 2013). Avoidant and impulsive/careless problem solving styles are characterized by behaviors that impair problem-solving skills (Nezu et al., 2013).

In contrast, individuals with a positive problem orientation typically engage in a more rational or planful problem-solving style (Nezu et al., 2013). This style consists of a systematic approach using a sequence of problem solving skills to develop the best possible solution. These skills include problem definition, generation of alternatives, decision making, and solution verification (Nezu et al., 2013).

D'Zurilla and Goldfried (1971) provided theoretical examples of how deficits in any of these problem-solving components may impair the overall problem-solving process, leading to ineffective solutions and unwanted consequences. Beginning with problem orientation, the authors stated that individuals with a negative problem orientation view problems as threatening and doubt their ability to produce an effective solution. Lacking a belief that the situation will be resolved well, these individuals may act impulsively, selecting and implementing a solution without considering broader consequences, or they may seek ways to avoid dealing with the problem altogether. In

either case, the problem is unlikely to be solved effectively, if at all, leading to greater problems.

Each of the rational problem-solving skills relies to some extent on effective utilization of the prior skills in order to be most effective. Therefore, a deficit in one skill affects the potential effectiveness of later skills and the outcome of the overall process (D'Zurilla & Goldfried, 1971). The lack of a clear definition of the problem will likely stymie generation of effective solutions. Generating few solutions decreases the chance of an effective solution being available for the decision-making stage. Making a poor decision and implementing an ineffective solution is likely to result in more problems, rather than resolving problems. Finally, inadequate evaluation of the outcome, either viewing positive outcomes as negative or ignoring evaluation of negative outcomes, impairs the ability to learn from the experience and develop more adaptive approaches to problems.

Role of Alternatives Generation in Problem-Solving

The generation of alternatives is a key component within the problem-solving process, as highlighted by D'Zurilla and Goldfried's definition of problem-solving cited at the start. The generation of alternatives is defined as the process of generating many possible solutions for a problem situation in such a way as to maximize the likelihood of generating effective solutions (D'Zurilla & Goldfried, 1971). Furthermore, the goal of generating alternatives within the social problem-solving framework is to provide the *most* effective solution for the problem situation. By generating as many alternatives as possible, the probability of generating a variety of potentially effective solutions increases. This greater selection allows for identification, selection, and implementation

of the most effective solution for the problem situation, facilitating the opportunity for maximizing positive outcomes and minimizing negative consequences. In contrast, deficits in generating alternatives would be expected to result in impaired problem-solving due to generation of a restricted selection of alternatives that may have been insufficient in producing truly effective solutions (D'Zurilla & Goldfried, 1971). With poorer quality alternatives generated, even the best solution among those generated may be ineffective at resolving the problem, likely resulting in more problems, increased stress, and psychological distress (Nezu et al., 1989). This relationship between deficits in alternatives generation and psychological distress is supported below.

Clinical Applications

Psychopathology-Related Deficits in Alternatives Generation

A wealth of research has supported the suggestion that a relationship exists between deficits in alternatives generation and emotional distress (Nezu et al., 1989). Noreen et al. (2015) evaluated the relationship between solution generation, rumination, and depression symptoms. Separate measures for rumination and depression were administered. Solution generation was measured using a modified version of the Means-Ends Problem Solving task (MEPS; Platt & Spivack, 1975). In the modified version six scenarios of problematic situations were presented rather than the ten scenarios of the original MEPS. In addition, these scenarios were adapted to describe situations that may be encountered by a college student population such as being avoided by friends; housemates not doing their chores; and feeling neglected by a partner. Participants were first given four of the six scenarios and instructed to generate consequences that may arise if the scenario was either resolved or left unresolved. They then received four

scenarios and were instructed to generate means to successfully reach the provided goal. Generated means were rated for their effectiveness in achieving the stated goal. The total quantity of generated relevant means was also measured. Quantity and effectiveness of relevant means on the MEPS were used as measures of quantity and quality of generated alternatives, respectively.

Noreen et al. (2015) found that greater levels of depression symptoms were significantly related to fewer generated relevant means and decreased effectiveness of generated means. Higher levels of rumination were related to similar outcomes in the two alternatives generation variables. Furthermore, level of depression symptoms but not rumination significantly predicted both the number of relevant means generated and the effectiveness of generated solutions for situations that had a resolved conclusion. In contrast, situations that left the problem unresolved resulted in rumination, not depression, being the only significant predictor of quantity of generated relevant means and solution effectiveness. The authors suggested that thinking about problem situations remaining unresolved promoted the belief that these situations are unsolvable and overwhelming, particularly for those prone to ruminative thinking (Noreen et al., 2015).

Similarly, Marx et al. (1992) evaluated the relationship between social problem-solving abilities and depression. They compared differences between a group of individuals with diagnosed depression, a clinical control group with predominantly anxiety-related diagnoses, and a non-clinical control group. Again, the MEPS was utilized to evaluate ability to generate means toward a solution. After generating means, participants were asked to rate the effectiveness of their solution, the effort required to implement the solution, generate potential obstacles that may arise while implementing

their solution, and generate alternative strategies for achieving the desired outcome. Independent experimenters also provided effectiveness ratings for participants' chosen strategy and the number of relevant means involved in the strategy.

Results indicated that both clinical groups generated significantly fewer relevant means, fewer obstacles, and fewer alternative strategies than the non-clinical control group. Furthermore, the group with depression generated a strategy that was significantly less effective than either the clinical or non-clinical control groups as rated by the independent raters. No difference in effectiveness was found between self-ratings of generated strategies between any of the groups. From these results, Marx et al. (1992) suggested that the two clinical groups may experience impairment at different stages of the problem-solving process. Although both clinical groups demonstrated impairment in quantity generation, only the group with depression displayed reduced quality of their generated solution.

Schotte and Clum (1982, 1987) proposed a diathesis-stress model of suicide and evaluated their model with several samples. They suggested that poor problem-solving skills (as measured by the MEPS) acted as a vulnerability factor that would result in significant levels of suicidal ideation when confronted with stressful situations. Four groups were created using mean splits of MEPS performance and negative life stress: high stress/poor problem solving, high stress/good problem solving, low stress/poor problem solving, and low stress/good problem solving. An ANOVA indicated that poor problem solvers under high stress endorsed significantly higher suicidal intent than the other three groups combined ($F(1, 174) = 9.01$, $p < 0.01$), than the good problem solvers under low stress ($F(1, 103) = 13.0$, $p < 0.001$), and poor problem solvers under low stress

($F(1, 70) = 7.3$, $p < 0.01$). Although suicide intent was lower for the good problem solvers than poor problem solvers under high stress, this difference was not significant. According to the authors, the same pattern of results was found when hopelessness was substituted for suicidal intent; however, the specific results were not reported (Schotte & Clum, 1982). In a subsequent study, these authors found that within a psychiatric sample, those with suicidal ideation demonstrated even more impairment in alternatives generation (as measured by the MEPS) than similarly depressed, non-suicidal control participants (Schotte & Clum, 1987).

Linda, Marroquín, and Miranda (2012) expanded on these results to examine relationships between solution generation, depressive symptoms, suicidal ideation, negative life stress, and hopelessness. The MEPS was used to evaluate the generation of relevant means toward solving a problem and achieving a provided goal. Furthermore, relevant means were divided into active and passive means. Active means were those steps that were considered to be initiated by the protagonist whereas passive means were those that relied on external influence (e.g. passage of time, chance occurrence, initiation by another character).

Individuals with a past suicide attempt generated a significantly greater quantity of passive means than individuals with no past attempt, but overall quantities of relevant means and active means were not statistically different between the two groups. For individuals who generated fewer relevant solutions and had a history of suicide attempt, greater negative life stress was significantly associated with greater suicidal ideation. This association disappeared for those who generated more relevant means or those without a prior suicide attempt. Contrary to the author's expectations, passive solutions

appeared to be a protective factor for individuals with a past suicide attempt. Among these individuals, negative life stress was associated with higher suicidal ideation for those low in passive solution generation. Individuals with an attempt history that were high in generation of passive solutions demonstrated no relationship between life stress and suicidal ideation. Furthermore, generation of active solutions did not moderate the relationship between life stress and suicidal ideation (Linda et al., 2012).

D'Zurilla and Sheedy (1991) studied the relationship between social problem solving abilities and stress in a college sample. Stress, number of problems, and social problem solving abilities were measured at the beginning of the semester and stress was measured again three months later at semester end. Components of social problem solving (problem orientation, problem definition, alternatives generation, decision making, and solution implementation) were measured using the Social Problem Solving Inventory (SPSI; D'Zurilla & Nezu, 1990). At the beginning of the semester, a more positive problem orientation was related to lower stress and fewer problems, whereas greater endorsement of using rational problem solving skills was related to lower stress but unrelated to number of problems. Hierarchical regression analyses were conducted to evaluate the effect of problem solving abilities on stress over time. After controlling for initial level of stress and number of problems, the authors found that problem orientation was a significant predictor of stress such that a more positive problem orientation at the beginning of the semester was related to lower stress at semester end. Rational problem-solving skills, as a whole, did not predict later stress. In a follow-up exploratory analysis, D'Zurilla and Sheedy (1991) entered each individual problem-solving skill into a hierarchical regression, again controlling for initial number of problems and stress level.

They found that only the alternatives generation skill was a significant negative predictor of end-of-semester stress ($\Delta R^2 = 0.015$, $F(1,123) = 4.22$, $p < 0.05$).

D'Zurilla and Sheedy (1991) suggested that a positive problem orientation provided a perception of control over situations that resulted in a reduction in stress, rather than facilitating effective problem solving to resolve stressors. They explained that the cognitive belief that problems are solvable rather than threatening inherently reduces stress associated with challenging events independent of actual problem-solving performance. In addition, they suggested that the effects of problem-solving skills (such as alternatives generation) for effectively resolving problems and reducing stress may require longer to be realized than the three-month timeframe of this study.

Nezu and Ronan (1987) evaluated differences in solution generation between groups of depressed and non-depressed college students. Groups were defined by scores on the Beck Depression Inventory (BDI; Beck, Ward, Mendelson, Mock, & Erbaugh, 1961). Individuals scoring above 11 on the BDI were considered depressed whereas those with BDI scores of 6 or below were designated as the non-depressed group. Scores above 10 are generally considered to indicate the presence of depressive symptoms (Beck, Steer, & Garbin, 1988). In addition, each group was divided further into those who received training in generating alternative solutions to a problem and those who were provided no specific training. Training involved providing instructions to generate as many solutions as possible while withholding judgment of those generated alternatives. All participants were then given two problem situations and asked to develop solutions. Solutions were rated according to effectiveness in solving the problem situation and each participant's

best-rated response was used to generate group means. In addition, the quantity of solutions generated was also measured.

Results indicated that the depressed group generated significantly fewer alternatives and less effective best-responses than non-depressed participants. However, they found improved effectiveness of the best-rated solution for both the depressed and non-depressed participants who received training (Nezu & Ronan, 1987).

Taken as a whole, results of these studies strongly suggest a relationship between the ability to generate alternative solutions and stress, depression, hopelessness, and suicidal ideation. Nezu et al., (1989) suggested that these relationships are likely reciprocal, noting that poor ability to generate solutions is likely to lead to ineffective problem-solving and negative outcomes, increasing negative life stress. Similarly, negative life stress may impair the ability to generate effective solutions, resulting in expected outcomes of problem-solving efforts to appear bleak and unhelpful. With negative life stress continuing to mount and generated alternatives proving ineffective, motivation for continued problem solving decreases, giving rise to distress, anhedonia, and hopelessness (Nezu et al., 1989).

Improving Alternatives Generation

D'Zurilla and Goldfried (1971) suggested that interventions targeting deficits in the problem-solving components would result in more effective problem-solving behavior, reduced maladaptive behavior, and reduced psychological distress. This hypothesis has been supported by multiple studies evaluating the efficacy of Problem-Solving Therapy as a treatment for depression (e.g. Cuijpers et al., 2018; Nezu et al.,

2013). A variety of ways for improving deficits in alternatives generation have been explored and shown to be responsive to training (Nezu et al., 2013).

Quantity principle. The quantity principle provides the basis for a solution generation step of the problem solving process. It states that generating a greater quantity of solutions will likewise increase the likelihood of generating effective solutions (Nezu et al., 2013). In other words, "quantity breeds quality."

This principle first emerged in early brainstorming research. Parnes (1961) instructed participants to generate ideas for solving a creative thinking problem for five minutes. The generated solutions were rated for their creativity in solving the problem. Analysis of intercorrelations indicated a positive relationship between total quantity of solutions generated and the rated quality of responses. Results also suggested that persistence in generating as many solutions as possible increased the number of quality responses. A greater quantity of quality solutions were found in the last half of generated solutions than in the first half (Parnes, 1961).

Nezu and D'Zurilla (1981) also evaluated effects instructional content on both generated solution quality and problem definition. Participants were divided into six groups and received instructions for one of three approaches for defining a problem in a situation and one of two approaches for generating solutions. The three variants of instructions for defining the problem included full training, general definition guidelines, or no instructions. Full training involved a detailed review of steps used to define the problem including describing the available facts of the problem, separation of relevant from irrelevant information, identification of goals, and identification of barriers to those goals. General guidelines provided only brief statements related to these steps (e.g. "keep

the goal in mind"). The two variants of instructions provided for generating solutions were either encouraging participants to generate as many solutions for the problem as possible or providing no instructions.

After receiving instructions, participants were asked to generate solutions to a hypothetical problem situation. Solutions were later rated according to their effectiveness in resolving the problem situation. Each participant's best rated solution was used to generate group means that were used in further analysis (Nezu & D'Zurilla, 1981).

For those who received no direction about how to generate solutions, significant differences in best-rated solutions were found depending on the level of instruction regarding problem definition. In addition, participants who received no instructions for solution generation generated significantly lower rated best-responses than those instructed to generate as many solutions as possible. The highest quality best-responses were generated by those groups who were provided training in alternatives generation. For these groups with generation training, no difference in quality of best-response was found between groups with varying levels of training in problem definition (Nezu & D'Zurilla, 1981).

It should be noted that Nezu and D'Zurilla (1981) did not provide results indicating the quantity of solutions generated or whether quantity of solutions was directly associated with higher best-response ratings. Given that all experimental groups were trained in the quantity principle, it is not unreasonable to assume that this training resulted in an increased quantity of generated solutions and that a greater quantity of generated solutions did, in fact, provide access to better quality solutions. However,

without confirmation of that assumption, the reported results only support the conclusion that training in the quantity principle improves the quality of the best solution generated.

To support the assumption in Nezu and D'Zurilla (1981), Del Missier et al. (2015) did report findings that increased quantity of generated alternatives improved the quality of the best-rated alternative. However, they also found that as the quantity of alternatives increased, the average quality of alternatives decreased. Similarly, Schweizer et al. (2016) discovered that a greater quantity of alternatives generated was related to greater divergence and inventiveness in alternatives but also increased difficulty in implementation. The negative association between quantity and average quality (Del Missier et al., 2015) or feasibility (Schweizer et al., 2016) suggests that a limited number of effective solutions exist for any given problem such that continued generation of solutions will result in an increasing number of ineffective or irrelevant solutions and a reduction in average quality. This makes average solution quality a misleading measure, given that the purpose of this process it to try to generate the *best* response possible and discard all lesser quality solutions (unless the selected option is discovered to be ineffective)(Nezu et al., 2013). Results also suggest that it is important to continue generating alternatives, even those that are of lower effectiveness, in order to eventually generate the highest quality alternative possible (Del Missier et al., 2015; Parnes, 1961).

Deferment of judgment. The deferment principle refers to withholding judgment about generated solutions until the generation stage is complete (Nezu et al., 2013). Consideration of the quality, morality, effectiveness, or social acceptability of solutions may inhibit generation of a wide range of responses. Any inhibition decreases the

likelihood of generating effective responses that may exist beyond the scope of an individual's typical behavior.

This principle is supported by early research by Meadow, Parnes, and Reese (1959). Participants received two problems that required a creative problem solving approach. For one problem, participants were instructed to generate as many solutions as possible and withhold evaluation of solutions until later. For the second problem, participants were instructed to generate only solutions of good quality, instigating an immediate evaluative process upon generation of a solution. Problems were counterbalanced according to instructional content. Significantly more good solutions were generated using the deferment principle than evaluating solutions as they were generated (Meadow et al., 1959). Similar to results of the quantity principle, Parnes (1961) discovered that a greater quantity of good quality solutions were generated in the final third of all solutions generated when participants were instructed to utilize the deferment principle.

Variety/diversity. The variety principle suggests that utilizing strategies to generate unique and creative solutions that are divergent from previous generated solutions may prompt generation of a previously unconsidered effective alternative. This approach is meant to shift away from becoming too focused on a single objective or solution strategy and consider new categories of approaches (Nezu et al., 2013). Identifying objectives one at a time and generating all solutions possible to meet that objective before considering the next may be a helpful strategy in generating a greater quantity and diversity of solutions (Butler & Scherer, 1987). This approach is discussed further in the "Cuing" section.

D’Zurilla and Nezu (1980) evaluated the ability of the quantity, deferment, and variety principles in generating quality solutions. Participants were separated into five groups and provided with varying instructions for generating solutions to a socially-oriented problem. Control participants were only told to “solve the problem” and not provided with any specialized instructions based on the principles above. All four experimental groups were provided with training in the quantity principle. Two of these groups were also provided with training in either the deferment or strategy principle. One group was provided with training in all three principles. Participant’s generated solutions were rated for effectiveness in solving the problem. Each participant’s best rated solution was used to generate best-response means for each group (D’Zurilla & Nezu, 1980).

Results indicated that all experimental groups generated significantly more effective best-responses than the control group. However, there was no difference in best-response rating between experimental groups. Given that training in the quantity principle was provided to each experimental group, the authors concluded that generation of as many solutions as possible should be encouraged in order to increase the effectiveness of the best response generated (D’Zurilla & Nezu, 1980).

D’Zurilla and Nezu (1980) also cited the emergence of a ceiling effect that may have masked differences between the experimental groups. They noted that the response effectiveness for the control group was nearly within the high effectiveness range of the rating scale, suggesting that participants may have already been relatively adept at problem solving. Inclusion of experimental groups that were trained only in either deferment or strategy principles would also have helped to evaluate benefits of these strategies in improving generation of better responses. Again, as in Nezu and D’Zurilla

(1981), the quantity of solutions generated was not reported, suggesting that the reader infer that instruction in alternatives generation principles resulted in an increase in quantity of alternatives generated.

Cuing. Cued-recall suggests that the presentation of cues can trigger access to memory networks and stimulate generation of alternatives. Butler and Scherer (1997) evaluated effects of providing objectives as cues to improve the quantity and quality of alternatives generated. Participants were grouped according to knowledge, determined by year in college (undergraduate vs. graduate students nearing completion of MBA). Participants were provided with written descriptions of two problem situations and asked to generate as many solutions as possible. The problem situations involved managing employee compensation and managing a sexual harassment situation. Participants were further divided into three experimental groups. One group received two conflicting situation objectives concurrently. A second group received these conflicting objectives sequentially, receiving the second objective after they had exhausted option generation for the first objective. The third group received no specific objectives for consideration. As an example, the two objectives provided for the employee compensation situation were: “1) to improve the performance quality of engineers, and 2) to hold down compensation costs.” (Butler & Scherer, 1997).

Results indicated that greater quantity and quality of alternatives were generated when objectives were presented. Presenting one objective at a time, rather than concurrently or not at all, resulted in a significantly greater quantity of alternatives in the sexual harassment situation. A similar, non-significant, trend was observed in the employee compensation situation. However, a greater quantity of *effective* responses was

generated for the employee compensation situation when objectives were presented one at a time compared to no objectives being presented. Butler and Scherer (1997) concluded that although providing objectives acts to prompt generation of effective solutions, presentation of several objectives at one time may act to constrain responses to only those solutions that satisfy all objectives. Siebert and Keeney (2015) reported similar results for participants who generated their own objectives for problem situations. Those who referred back to their objectives one-by-one generated more alternatives than those who did not refer back to objectives, or those who referred to all their objectives at once.

Overall, fewer alternatives were generated for the sexual harassment situation than the employee compensation situation. The authors suggest that situational differences, such as greater emotional intensity, may have impacted the ability to generate alternatives (Butler & Scherer, 1997).

Those in the high knowledge group generated a greater total quantity of alternatives and a greater quantity of effective options than the low knowledge group. The authors noted that experience with situations similar to those presented may explain this difference: the high-knowledge group indicated greater experience with the employee compensation situation than low-knowledge participants, but no difference in experience was found between groups for the sexual harassment situation. They also note that greater development of problem-solving skills in the higher knowledge group may explain differences (Butler & Scherer, 1997).

An alternative approach to cuing involves using lists of possible solutions as cues. Del Missier and Terpini (2009) evaluated the effects of part-set cuing on generating

alternatives. Participants were asked to generate as many options as possible within five minutes for each of three scenarios. Participants were divided into three groups that each received varying numbers of option cues. The two cued groups received a list of example options for each scenario, with the weak-cue group receiving 25% fewer cues than the strong-cue group. The control group received no example-option cues. Generation of non-cue alternatives was measured for each group. Although control groups did not receive any cues, generated alternatives that matched the cues provided to the experimental comparison groups were not included in their response totals. The authors explained that the presence of cue lists automatically reduced the number of viable alternatives that could be generated; therefore, disallowing items on these lists to be counted toward the non-cue group's responses would make results comparable.

Results indicated that both groups receiving cues generated significantly fewer non-cue alternatives than the control group for two of the three scenarios. No difference in non-cue alternatives was found for the third scenario (Del Missier & Terpini, 2009).

The authors suggested that cuing engaged inhibitory processes that impaired retrieval of information unrelated to the cues. They also noted the scenario-specific findings and suggested differences in situational knowledge related to the scenarios described may have influenced the differences. The two scenarios demonstrating greater impact from cuing involved generating hypotheses for why a radio was not working and identifying authors of books one may want to read. Knowledge of how radios work and knowledge of book authors would have had a significant impact on results. The third scenario involved generating alternatives for a gift that might be purchased for oneself. In this case, potential alternatives are much more subjective and less related to domain

knowledge. The scenarios also differed in that the gift scenario called for generating alternatives that would likely inform later decision making, whereas the other two scenarios simply prompted for idea generation (Del Missier & Terpini, 2009).

The results of cuing studies suggest that cuing may be beneficial in promoting greater generation of alternatives if performed correctly. Specifically, providing cues of specific solution alternatives may serve to restrict further generation, whereas providing broad objectives one-at-a-time and requesting an exhaustive list of alternatives be generated before presenting the next objective may promote generation.

Role of Alternatives Generation in Psychotherapy

In summary, research has identified relationships between generating alternatives and distress (primarily related to depression) (Nezu et al., 1989). Furthermore, it has been shown that this skill can be improved through training to provide better quality solutions (Butler & Scherer, 1997; Del Missier et al., 2015). Together, these results suggest that training in alternatives generation may be an effective intervention for reducing stress-related psychopathology. However, there is a lack of research explicitly evaluating this proposition. Instead, the bulk of the intervention literature is focused on overall problem-solving ability, with alternatives generation subsumed along with other problem solving skills (e.g. problem definition, decision making, and solution implementation) under the label of the rational problem-solving style. Given the lack of research examining whether improvements in alternatives generation subsequently reduce distress, evaluation of interventions to improve rational problem solving provides the closest (yet empirically inadequate) analogue.

Shifting from a negative to positive problem orientation and developing skills that foster effective use of rational problem solving are the key goals of PST (Nezu et al. 2013). Nezu et al. (2013) describe four "toolkits" of PST intended to address different obstacles preventing effective problem solving: overcoming cognitive overload, overcoming emotional dysregulation, overcoming negative thinking, and developing problem-solving skills. The toolkit for overcoming cognitive overload includes strategies for simplifying and visualizing the problem in order to reduce feeling overwhelmed, giving up, and avoiding problem-solving efforts. To overcome emotional dysregulation that might increase chances of acting impulsively, skills are taught to help an individual slow down and reduce emotional intensity before attempting to problem-solve. Such skills include deep breathing, progressive muscle relaxation, guided imagery, and seeking social support, among others. The third toolkit directly targets a negative problem orientation and uses cognitive restructuring techniques in an attempt to shift thinking toward a more positive problem orientation. Rational problem-solving skills (including generating alternatives) are taught and practiced in the final toolkit (Nezu et al., 2013).

Although PST is dedicated to improving each component of problem solving discretely, alternatives generation is a factor in each toolkit. The first two toolkits attempt to target factors – cognitive overload and emotional dysregulation – that may result in ineffective problem solving styles – impulsive/careless and avoidant. The impulsive/careless problem-solving style is characterized by quick responses to problems and little consideration of consequences beyond the present moment. Typically, this involves minimal generation of alternatives and implementation of the first solution that comes to mind. Research suggests that when responding quickly to a problem the

effectiveness of the first solution generated is reduced as the problem situation becomes increasingly unfamiliar (Laborde & Raab, 2013; Raab & Johnson, 2007) or when affect is present (Laborde & Raab, 2013). Utilization of this problem-solving style will undoubtedly result in employing ineffective solutions, allowing problems to persist, become worse, or give rise to new problems.

The avoidant style is characterized by passivity, dependency, and procrastination (D'Zurilla et al. 2004). Rather than generate solutions that might resolve a problem, alternatives generated using an avoidant style typically serve to mitigate the immediate or expected unwanted emotional responses to a problem (e.g. anxiety, frustration). This problem-solving style can become self-reinforcing, as generated alternatives (such as distraction techniques) often provide temporary, short-term relief from unwanted emotions. However, without efforts to solve the problem itself, it will continue to elicit unwanted emotional responses (Nezu et al., 2013).

As described, both of these maladaptive problem-solving styles involve ineffective generation of alternatives. Therefore, the toolkit interventions that reduce engaging in these styles have implications for improving generating alternatives. The third toolkit – overcoming negative thinking – utilizes cognitive restructuring techniques to shift perspective to a more positive, realistic orientation. Using a current problem situation, negative thoughts and beliefs related to the problem are identified, then emotional consequences of these beliefs are described. This provides an example of how negative, often inaccurate, thinking about problems can lead to unwanted consequences. The individual is then guided through a process of generating alternative ways of thinking about the problem situation in order to discover more accurate, realistic, and

adaptive perspectives. In this toolkit, generating alternatives is utilized to shift perspectives toward a positive problem orientation, and this shift might also improve later generation ability. The final toolkit includes specific training in generating alternatives using principles previously described (Nezu et al., 2013).

The efficacy of PST in reducing symptoms of psychopathology has been supported by a number of studies. A recent meta-analysis was conducted to evaluate the effectiveness of PST compared to other treatments and control groups for treating depression (Cuijpers et al., 2018). They evaluated 30 randomized controlled trials of PST that included 3,530 patients. They found a large effect size of PST versus control group (Hedge's $g = 0.79$) indicating that PST was far more effective than control conditions at reducing depressive symptoms. However, they found high heterogeneity among these results prompting an evaluation of studies with a low risk of bias. To determine level of bias, studies were evaluated according to adequate generation of allocation sequence, concealment of allocation to conditions, evaluator blinding procedures, and methods for dealing with incomplete outcome data. Using the nine studies determined to have low risk of bias, Cuijpers et al. (2018) found a small effect size of PST versus control conditions ($g = 0.34$) with low heterogeneity. They found that this effect size was comparable to that of other established treatments for depression (e.g. cognitive-behavior therapy, interpersonal therapy). These results replicated findings in previous meta-analyses (e.g. Barth et al., 2013; Malouf, Thorsteinsson, & Schutte, 2007).

Similar results were found in a meta-analysis performed by Bell and D'Zurilla (2009). In addition, they performed a component analysis to evaluate the respective contribution of training for problem orientation and training problem-solving skills (e.g.

rational problem solving) on the treatment effects. They found a significant difference in effect sizes between studies where training in all components of PST (problem orientation and the four problem-solving skills) were provided versus studies where one component was missing (Cohen's $d = 0.84$ vs. $d = -0.04$, respectively, $p < 0.05$). Furthermore, they found a significant difference in effect sizes in favor of training in problem orientation versus not ($d = 0.80$ vs. $d = -0.10$, $p < 0.05$) and a difference in effect sizes approaching significance between studies that provided training in all four rational problem solving skills and those that did not ($d = 0.66$ vs. $d = -0.02$, $p = 0.06$).

These results suggest that training in all aspects of social problem solving is important in reducing depressive symptoms, although problem orientation emerged as particularly important (Bell & D'Zurilla, 2009). However, these results do not provide a clear understanding of the role of generating alternatives in symptom reduction. Many efficacy studies did not include measures of individual problem-solving components, and those that did rarely evaluated alternatives generation or the other rational problem-solving skills. The few PST efficacy studies that did evaluate alternatives generation suggest that this skill is important to the treatment process.

Arean et al. (1993) compared the effectiveness of PST and Reminiscence therapy for treating depression in adults above the age of 55 years old. Reminiscence therapy (RT) involved guiding participants through a review of their life histories, highlighting significant events and working to develop a greater satisfaction with what they had achieved. Problem-solving abilities were assessed using the Social Problem Solving Inventory (SPSI; D'Zurilla & Nezu, 1990). Both treatments were effective at reducing depression symptoms compared to the wait-list control, but PST demonstrated

significantly greater improvements than RT. For those who received PST, rational problem-solving skills of generating alternatives, problem definition, and decision making improved significantly over 12 weeks from pre-treatment to post-treatment assessment. Problem orientation had also become more positive at post-treatment; however this improvement was not significant. These gains were maintained at a three-month follow-up assessment, at which time a significant increase from pre-treatment of positive problem orientation was found. No significant changes in problem-solving abilities were found in the RT or wait-list control groups.

Another study evaluated the efficacy of PST and supportive therapy for treating depression and disability in a group of older adults (above 66 years old) with diagnosed major depressive disorder and executive dysfunctions (Alexopoulos, Raue, & Arean, 2003). The authors used the SPSI (D'Zurilla & Nezu, 1990) to only measure generation of alternatives and decision making due to their hypothesis that these skills would mediate the treatment effects of PST. Results indicated that PST was significantly more effective than supportive therapy at reducing depressive symptoms and disability. Both measured problem-solving skills improved more from pre-treatment to post-treatment for the PST group compared to the supportive therapy group. Using hierarchical regression analyses, the authors evaluated whether the two problem-solving skills mediated the relationship between treatment and change in depression and disability. Treatment was entered as the first variable and the two problem-solving skills entered next. The authors determined that the problem-solving skills of generating alternatives and decision making were mediators of the relationship between treatment and reductions in both depressive symptoms and disability.

Overall, research suggests that alternatives generation is related to psychological distress and that this skill is responsive to training. These results confirmed hypotheses presented by D'Zurilla and Goldfried (1971) suggesting a relationship between problem-solving deficits and distress that could be improved through intervention. Upon this foundation, Problem-Solving Therapy was developed and gained substantial empirical support for its efficacy in treating depression. However, one of the primary assumptions underlying this literature is that an individual has time to analyze a problem, generate a myriad of solutions, and make an informed decision about the most effective approach to overcoming a problem. What if a quick response is required?

Urgency and Alternatives Generation

Although many situations allow ample time to consider alternatives, problem situations often arise that demand a more immediate response. Cognitive research has identified different mechanisms at work when generating alternatives to urgent problems versus problems with more time to solve. These mechanisms suggest a problem-solving approach for urgent problems that is quite different from that proposed by D'Zurilla and Goldfried (1971).

Cognitive Processes Associated with Brief Generation

In a series of studies that evaluated response generation when faced with time-pressure, participants were presented with 70 brief descriptions of ill-structured real-world problem situations, asked to generate solutions, and choose the most effective solution from among those generated (Kaiser et al., 2013; Schweizer et al., 2016). Participants were first given eight seconds to generate alternative solutions in their minds for each situation and then provided an additional eight second to verbalize the solutions

generated for audio recording. Next, they were instructed to select the alternative that they believed would be most effective in the situation. Responses were rated according to three factors of creative quality: divergence, originality, and feasibility. Divergence measured the extent to which generated alternatives for a situation differed from one another. Originality was a measure of the inventive quality of alternatives. Feasibility evaluated the extent to which an alternative could be performed in the situation. Quantity of solutions generated and how quickly solutions were generated were measured along with performance on a battery of cognitive measures. The cognitive battery included measures assessing creative problem solving (Remote Associates Test, RAT; Mednick, 1962), creative idea generation (Product Names Task; Marsh et al., 1999), verbal fluency and set shifting (selected fluency tasks of the Regensburg Word Fluency Test, RWT; Aschenbrenner, Tucha, & Lange, 2000), numerical set shifting (Plus-Minus Task; Spector & Biederman, 1976), and memory recall (Verbal Learning and Memory Test, VLMT; Helmstaedter et al., 2001). Participants were also asked to rate their familiarity with each of the situations presented (Kaiser et al., 2013; Schweizer et al., 2016). In the later study, participants were additionally instructed to rate the emotional valence of each situation (Schweizer et al., 2016)

In the first study (Kaiser et al., 2013), quantity of options generated was greater when familiarity was greater ($t(48) = 3.92$, $p < 0.001$). In addition, greater option generation quantity was related to increased performance on long-term memory retrieval ($r = 0.32$, $p < 0.05$) and category verbal fluency tasks ($r = 0.33$, $p < 0.05$). The authors suggested that given the time restraints (eight seconds), participants relied heavily on

memory retrieval rather than a more evaluative and creative process that may result in more effective solutions.

Results of the second study (Schweizer et al., 2016) found that divergence and feasibility of alternatives were not associated with performance on any cognitive measures. Verbal set shifting was associated with greater originality of alternatives. Quantity and speed of generating alternatives were related to greater verbal fluency and verbal set shifting. The brief time allowed for generating alternatives likely created a constraint that benefitted more fluent thinkers and could be confirmed with future research that compares differences in quantity of generated alternatives across conditions with differing allotted response times. Future studies utilizing a similarly brief time allowance should control for verbal fluency (Schweizer et al., 2016).

With regards to familiarity and valence, greater familiarity with a situation was related to more original and less feasible options. Similarly, a greater negative situational valence was related to more original and less feasible options. Schweizer et al. (2016) suggested that when faced with unpleasant situations, motivation to generate solutions increases even if this results in generation of unfeasible solutions. Further, they suggest that familiarity with an unpleasant situation may provide a sense of security that facilitates greater creativity of generated solutions.

Additional findings have resulted in two conceptualizations of cognitive processes underlying alternatives generation: memory-based and ideation-based. According to the memory-based explanation of alternatives generation, situations trigger an associative-recall process to generate alternatives. Long-term memory is accessed for past experiences similar to the present situation in order to generate previously successful

solutions. If recall fails to generate a solution, executive control uses cues to shift to a different past experience to draw from (Adelman, Gualtieri, & Stanford, 1995). The ideation-based theory places more emphasis on transformation of options to generate more responses, returning to memory recall when transformations fail to generate a unique response (Engelmann & Gettys, 1985; Keller & Ho, 1988).

Del Missier, Visentini, and Mäntylä (2015) evaluated cognitive processes underlying the alternatives generation process with these two cognitive theories in mind. Participants were provided three problem situations and allowed six minutes to generate as many solutions as possible. Participants were also asked to rate each situation according to perceived difficulty of the situation, knowledge related to the situation, and experience with similar situations. In a separate session, participants completed measures of working memory (a letter-memory task developed by the authors), response inhibition (Stroop task; Stroop, 1935), set shifting (Plus-Minus task; Spector & Biederman, 1976), cued memory recall (paired-associates task), verbal fluency (letter and category fluency tasks), fluid intelligence (Raven's Standard Progressive Matrices, SPM; Raven, et al., 2003), analytical thought (Cognitive Reflection Test, CRT; Frederick, 2005), ideation ability (Alternative Uses Test; Guilford et al., 1978), and executive control without an ideation component (Applying Decision Rules, ADR). It was expected that if the ideation theory of generation ability held true, that performance on ideation fluency measures would be related to option generation but not to ADR performance, and performance on other cognitive measures would be related to ADR but not option generation. Large differences in measured variables were found between the three problem situations

provided; therefore, separate analyses were conducted for each problem situation (Del Missier et al., 2015).

Support for the ideation theory of option generation held true. The quantity and diversity of options generated was positively related to performance on a measure of ideation ability, but generally unrelated to other cognitive measures. Performance on the ADR task was positively related to other cognitive measures, but unrelated to ideation fluency (Del Missier et al., 2015), further supporting the ideation theory.

Additional relationships emerged only for the situation rated as most familiar (situation involving energy saving). For this situation, greater quantity of generated alternatives was related to greater delayed memory recall and higher verbal fluency. Similar results emerged using a hierarchical regression analysis. Non-fluency cognitive measures were entered in step 1, verbal fluency measures in step 2, situation knowledge and experience in step 3, and ideation fluency measures in step 4. Ideation fluency was found to be the greatest predictor of quantity of generated alternatives for all three situations. Situation knowledge and experience was only a significant predictor in the energy saving situation with verbal fluency measures approaching significance as predictors (Del Missier et al., 2015).

The results of these studies suggest that different processes are engaged depending on the urgency of the situation. A number of studies with brief time limits for generating alternatives (10 seconds or less) found stronger association with memory-recall tasks and verbal fluency (e.g. Kaiser et al., 2013) whereas those with extended or unlimited generation periods (several minutes or more) demonstrate a greater association to creativity tasks (e.g. Del Missier et al., 2015).

In support of these findings, Gilhooly, Fioratou, Anthony, and Wynn (2007) evaluated generated responses according to whether they were accessed from memory or represented a newly generated idea by asking participants to sort their generated responses accordingly. Participants were asked to express their thought process verbally as they generated alternative uses for common items. Transcriptions of participants' processes were transcribed and coded according to a variety of generation strategy categories (e.g. "episodic memory use" or "disassembly uses"). They found that alternatives generated earlier in the process relied more on memory strategies whereas later alternatives were generated from a more creative, associative process.

In summary, it is clear that memory recall, verbal fluency, and ideation ability are all related to alternatives generation and that the strength of these relationships is dependent on situational demands, particularly regarding urgency to generate responses. More specifically, initial responses and those in response to brief time limits are more dependent on memory processes. As more time is allowed to generate responses, memory-based responses are depleted and generation shifts to a creative, ideation-based approach. This suggests that more novel, creative, and potentially more effective alternatives may be generated as more time is dedicated to generating a greater quantity of alternatives, supporting the quantity principle (Parnes, 1961). However, when time is short and response urgent, memory processes are responsible for supplying solutions. This means that familiarity and previous experience with a situation may allow for better quality of initial, in-the-moment responses.

Take-the-First Heuristic

Take-the-first (TTF) is a decision making heuristic that has gained momentum in cognitive research of alternatives generation. Proposed by Johnson and Raab (2003), TTF suggests that the best option in a familiar situation is typically one of the first options generated. This heuristic assumes that options are generated in order of associative strength and that associations are driven by previous experience and expertise (Raab & Johnson, 2007). To evaluate alternatives generation in this context, some research has imposed significant restrictions in time allowed for generating alternatives, often using sport situations as an analogue (Belling, Suss, & Ward, 2015; Johnson & Raab, 2003; Raab & Johnson, 2007).

Johnson, Raab, and Laborde identified defining characteristics of TTF in a series of studies (Johnson & Raab, 2003; Laborde & Raab, 2013; Raab & Johnson, 2007). They recruited participants with varying levels of handball expertise to watch 3D videos of handball attack situations. During 10 second pauses in the video, participants were asked to verbally state potential options for action and then choose their preferred action.

Johnson and Raab (2003) found that the quality of each subsequently generated option decreased compared to the previously generated option. They also found that an increased quantity of options generated was related to decreased quality of the option selected for implementation by participants. One explanation for this result could be that participants with less experience engaged an ideation process that did not have enough time to develop an effective response (Gilhooly et al., 2007).

Raab and Johnson (2007) reported results of a two-year longitudinal study of participant groups with different handball expertise. Results indicated that for each time

point, the initial option generated was of significantly better quality than subsequently generated options, replicating previous results (Johnson & Raab, 2003). Initial options generated were of higher quality for those with greater expertise than for the lesser expertise groups. Raab and Johnson (2007) suggested that in high-pressure situations, it is advantageous to generate a limited number of options based on previous experience.

Laborde and Raab (2013) evaluated effects of mood on the TTF option generation process. Mood was influenced using several methods. First, images depicting themes of self-esteem, self-confidence, and motivation were displayed along with sentences expressing the same themes but worded positively or negatively depending on the experimental condition. A neutral imagery condition displayed video of a person reading about concentration. Second, music or crowd noise was used to elicit mood. Participants in the positive condition were asked to bring three songs they found motivating to listen to before competition. The negative group listened to displeased crowd noises, such as booing or hissing. The neutral group listened to the video of the person reading about concentration. Third, manipulated feedback was provided after each action choice. Those in the positive group received positive feedback (a green light and applause sounds) after 24 choices and negative feedback after 7 choices (a red light and booing) whereas the negative group received the reverse. The neutral group received no feedback. Finally, in an attempt to promote motivation, all participants were informed that the top three participants would receive prizes. Mood was evaluated using the Positive and Negative Affect Schedule (PANAS) before and after the experimental condition.

Results indicated no change in affect during the study for those in the positive condition. The neutral group reported a significant decrease in positive affect from pre- to

post-test. The negative group demonstrated a significant increase in negative affect (Laborde & Raab, 2013).

Replicating previous results (e.g. Raab & Johnson, 2007), expertise was found to be related to improved quality of initial option generated and for mean quality of options generated. Induced mood was not related to any generation variables (initial option quality, mean quality, or quantity)(Laborde & Raab, 2013).

A second stage of the study was conducted to evaluate results using a within-subjects design. Non-expert participants were recruited and participated in all mood conditions in counterbalanced order. Results indicated that the neutral condition elicited better quality of initial options generated, better mean quality of options, and faster generation of options than either of the valence conditions. These results suggested that both positive and negative affective states can impair quality of alternatives generated during quick decision making and that neutral affect can promote improved quality of generated responses (Laborde & Raab, 2013).

Support for effective use of TTF can be found in results reported by Kaiser et al. (2013). They found that participants selected first generated option significantly more often than other generated options when engaging in time-limited decision making. Given the findings that the first option generated using TTF is often of highest quality (Johnson & Raab, 2003; Laborde & Raab, 2013; Raab & Johnson, 2007), this strategy appears to be the most effective problem-solving approach during time-limited situations. The authors noted that in situations where memory recall plays a large role in generating solutions (e.g. high familiarity or expertise), effective options will have greater associative strength and be more likely to be generated early (Kaiser et al., 2013).

Utility of research in this area toward facilitation of effective social problem solving may be found in evaluating how engaging in effective, deliberate problem solving generalizes to situations in which quick decisions are necessary. Drawing from social learning theory and results of cognitive research, use of deliberate problem solving to generate and implement adaptive behaviors would likely be reinforced by the environment. Continued effective use and reinforcement would allow these behaviors to be encoded in long-term memory, at which point they could be retrieved as effective responses to similar, urgent situations.

Another implication of cognitive and TTF research is that there does not exist a uniformly accepted measure for assessment of alternatives generation in urgent situations. Instead, researchers develop and utilize their own method for assessing alternatives generation, creating difficulty in comparing and aggregating results into a comprehensive understanding of the processes involved. Even so, existing assessment measures have raised concerns about ecological validity and may be due for an update.

Assessment of Alternatives Generation

As highlighted by the research already reviewed, two primary measures have emerged for assessment of social problem-solving ability: the Social Problem-Solving Inventory (SPSI; D'Zurilla & Nezu, 1990) and the Means-Ends Problem Solving task (MEPS; Platt & Spivack, 1975).

Common Measures

Since its development, the SPSI (D'Zurilla & Nezu, 1990) has become a common measure for evaluating the components of social problem solving identified by D'Zurilla and Goldfried (1971). This 52-item self-report measure includes scales for the two types

of problem orientation and three types of problem-solving styles. Furthermore, the rational problem solving scale breaks down into subscales of the four problem solving skills. Research using this measure has identified negative problem orientation as a key predictor of distress and psychopathology, with problem-solving skills (including alternatives generation) having less impact (D'Zurilla & Sheedy, 1991). As a self-report questionnaire that targets attitudes and self-appraisal, the SPSI is a quick and easily-scored measure provides useful information about cognitive sources of distress that may be influencing current levels of distress. This information and the easy-to-administer format make the SPSI an ideal measure for use in clinical settings.

In contrast, the MEPS (Platt & Spivack, 1975) is a performance measure designed to evaluate the ability to generate appropriate steps toward reaching a goal. The MEPS consists of 10 short descriptions of interpersonal problem situations. These descriptions include the protagonists intended goal and a statement stating that they reach their goal. Participants are asked to create the middle of the story, generating the steps they believe to be necessary to get from the initial problem situation to the provided goal. The number of relevant steps generated toward reaching the goal is typically reported as a measure of generation fluency. This process provides information about how an individual applies problem-solving skills to a hypothetical problem situation, allowing evaluation of actual ability rather than self-appraisal of generation ability. As such, the MEPS and variations of this measure are typically used in neuropsychological research to evaluate cognitive processes involved in generating alternatives and problem solving. Given the variety of adaptations, common characteristics of these approaches will be described with brief examples of variations.

Measure Variations

Instructional content. Instructions for alternatives generation tasks generally consist of asking a participant to read or observe a problem situation then generate alternatives for solving the problem. As noted, providing instruction on how to generate an increased number of alternatives (i.e. defer judgment) can have a significant effect on the quantity and quality of alternatives generated compared to encouraging only quality or providing no direction at all (D'Zurilla & Nezu, 1980; Meadow et al., 1959; Nezu & D'Zurilla, 1981; Parnes, 1961).

In addition, at least one study has evaluated generation of alternatives by asking participants to report a snapshot of only those alternatives being considered at a critical decision point (Belling et al., 2015). This approach may have provided a better approximation of solution generation in an urgent situation, relying more on memory recall and experience to generate automatic responses rather than employing problem-solving ability.

Time limits. The amount of time provided for generating alternatives necessarily impacts the quantity of solutions generated; therefore, the effect of time limits on quality of responses is of more interest. Evidence suggests that allowing a greater amount of time to generate alternatives can lead to better quality alternatives (Meadow et al., 1959; Parnes, 1961). This is likely related to a shift from memory-based generation to ideation-based generation that can utilize effective solutions from previous experience to postulate even more effective potential solutions (Del Missier et al., 2015; Gilhooly et al., 2007). This is congruent with the goal of social problem solving to facilitate generation of the most effective alternative possible. For the purposes of assessment and limiting test

fatigue, no more than five minutes might be necessary for generating an exhaustive list of alternatives. Del Missier and Terpini (2009) noted that a great majority of alternatives for a problem situation were generated within 3-4 minutes, and most participants were unable to generate additional solutions beyond 5 minutes.

Situation description. Situation descriptions vary widely in length and detail. For example, scenarios in the MEPS are each four or five sentences long (Platt & Spivack, 1975) whereas the two scenarios provided by Butler and Scherer (1997) are 9 or 14 sentences long and the three scenarios described by Del Missier and Terpini (2009) are between two and four sentences long. Longer descriptions provide more information about a scenario, which may prompt additional considerations when generating alternatives and result in such specificity that results are difficult to generalize beyond the described situation. Providing a short description may elicit a greater variety of generated responses due to the open-ended nature of the scenario. Support for this hypothesis might be found in the results of the cuing studies. Too much description provided all at once may restrict the quantity and quality of alternatives generated (Butler & Scherer, 1997; Del Missier & Terpini, 2009).

Some researchers have provided situation objectives similar to the end goals described in each MEPS scenario (Butler & Scherer, 1997; Siebert & Keeney, 2015). Results of these studies indicated that participants who considered objectives one at a time generated greater quantity and quality of responses than those who received all objectives at once or no objectives. Therefore, to facilitate greater response generation, it may be helpful to instruct participants to identify an objective and generate responses for

that objective, then repeat with a new objective, until generation of both objectives and alternatives are exhausted.

Outcome variables. The methods for determining outcome variables of quantity and quality vary across studies. The quantity of alternatives generated is often measured by counting only the unique alternatives; duplicate or extremely similar responses are not counted multiple times. For this purpose, multiple raters are used to evaluate uniqueness of response and come to consensus (e.g. Butler & Scherer, 1997; Gettys, Pliske, Manning, & Casey, 1987; Schweizer et al., 2016). The quantity of solution categories, often categorized according to objective, has also been used as an outcome measure (Engelmann & Gettys, 1985; Gettys et al., 1987). One study differentiated between whether generated alternatives were active (initiated by protagonist) or passive (initiated by other or environment) (Linda et al., 2012).

The quality of generated alternatives is an important measure in assessment, given that the purpose of generating alternatives is to generate the best *quality* alternatives. The quality of alternatives has been rated according to task-relevance (Belling et al., 2015; Platt & Spivack, 1975), effectiveness in solving the problem (Channon & Crawford, 1999, D'Zurilla & Nezu, 1980; Del Missier et al., 2015; Nezu & D'Zurilla, 1981), divergence, feasibility (Kaiser et al., 2013; Schweizer et al., 2016), and social appropriateness (Channon & Crawford, 1999; Crawford & Channon, 2002). Furthermore, quality ratings have been evaluated using average quality rating of alternatives (Johnson & Raab, 2003; Laborde & Raab, 2013; Raab & Johnson, 2007), identifying the best-rated alternative (D'Zurilla & Nezu, 1980; Nezu & D'Zurilla, 1981), or counting the quantity of good-

quality (e.g. effective) alternatives (Belling et al., 2015; Del Missier et al., 2015; Platt & Spivack, 1975).

Validity Concerns

Measures of alternatives generation have their limitations and concerns have been raised about their ecological validity (Foxx & Faw, 2000). As a self-report measure, the SPSI measures attitudes and self-assessment of abilities, rather than actual, real-life problem-solving performance. In contrast, although the MEPS is a performance measure, it evaluates the ability to generate solutions to hypothetical problems, rather than real-life situations. Research suggests that although these measures may be reliable at evaluating attitudes and alternatives generation for hypothetical solutions, these abilities may not translate to real-world performance (Anderson et al., 2009; 2011)

In two studies, Anderson et al. compared problem-solving performance on several measures: SPSI-r (D'Zurilla et al., 2002), four scenarios of the MEPS, an adapted version of the MEPS (PMEPS), and a problem-solving diary. The PMEPS utilized the same four scenarios used in the MEPS procedure; however, after administration of the MEPS, participants were asked to think of situations they had experienced that were similar to those of the MEPS. They were asked to describe how they originally managed the situation and how they would have ideally handled the situation. Relevant means and overall effectiveness was measured for each MEPS and PMEPS solution. For the diary procedure, participants were asked to record at least four problem situations where the solution was not immediately obvious over a 2-4 week period. Similar to the PMEPS, they were asked how they actually handled the situation and how they would have ideally handled the situation, and these solutions were rated for effectiveness (Anderson et al.,

2009, 2011). The sum of the results indicated that the MEPS measures were more related than the SPSI-r scales to the "real-life" measures of the PMEPS and diary (Anderson et al., 2009). In addition, longitudinal results showed that the MEPS was a significant predictor of later depression, whereas the SPSI-r was not. However, although the MEPS showed better correlation to real-life measures, these relationships were far from universal and cannot be interpreted as endorsement of the MEPS as a measure of real-life performance. Similarly, the "real-life" measures may also not assess an accurate representation of actual problem-solving performance. As Anderson et al. (2009) explain, the PMEPS and diary were not completed in-the-moment, but rather as a recollection of events that had previously occurred. This allows for the introduction of bias or inaccurate memory to alter the account of what actually happened. Nonetheless, they suggest that such "real-life" measures may provide beneficial information in congruence with traditional assessment methods (Anderson et al., 2011).

Implications and Future Directions

The social learning conceptualization of problem-solving and resulting applications such as PST are focused on supporting a deliberate process of generating and implementing solutions so as to maximize desired outcomes. However, this approach does not account for the many problem situations that arise during everyday life that require a quick response. Cognitive research of alternatives generation identified different processes used to generate alternatives according to whether plenty or little time was available for generation. For quick responses, memory and fluency processes were primarily activated, whereas for more deliberate responses, these processes gave way to a more creative ideation process (Gilhooly et al., 2007). Furthermore, the first response was

typically the best quality response when responding quickly, especially when the situation was familiar and effective solutions could be accessed from memory. However, much early research into brainstorming and later investigations into improving alternatives generation suggested that even more effective solutions could be generated with more deliberate effort (Parnes, 1961; D'Zurilla & Nezu, 1980). Future research could evaluate the hypothesis that more use of deliberate efforts of effective problem-solving would encode more effective responses for recall in urgent situations.

Much of the research investigating benefits of improving alternatives generation is either more than a half-century old (e.g. Parnes, 1961) or does not report data necessary to support the proposition that "quality breeds quantity" (D'Zurilla & Nezu, 1980; Nezu & D'Zurilla, 1981). It may be worth replicating these studies to clarify support for the generation-improving principles that have been the cited since D'Zurilla and Goldfried (1971) developed their problem-solving model.

Assessment of alternatives generation and problem-solving as a whole has drawn concern regarding ecological validity (Anderson, et al., 2009, 2011; Foxx & Faw, 2000). Although common assessment methods (e.g. SPSI, MEPS) have proven useful for identifying relationships between ability deficits and distress, it is unclear whether the abilities they measure translate to actual real-world behavior. Furthermore, a wide variety of assessment methods and outcome measures loosely based on the MEPS have been utilized in cognitive research of problem-solving components, resulting in a largely heterogeneous set of results that are difficult to accurately compare. Development of a new measure to evaluate alternatives generation ability or problem-solving with greater

ecological validity could help normalize methods and outcomes of cognitive research and provide a more accurate measure of real-life problem-solving for clinical research.

Finally, problem solving therapy (PST) and research examining alternatives generation utilize target problems that may be contributing to depression, such as interpersonal conflicts or financial difficulties (e.g. Butler & Scherer, 1997). Depression is considered an outcome that can be affected through improved management of stressors brought about by more effective problem solving. However, depression is not only an outcome of dysfunctional problem solving, but also a contributor. Yet, to the best of this author's knowledge, depression has not been utilized as the target problem in the alternatives generation or broader problem solving literature. The impetus for the current study is to fill this gap in the literature and take the first step in validating the utility of depression as a target problem situation.

Method

Participants

Participants were recruited from the undergraduate psychology research pool at a private, Jesuit university in the Midwest during the Spring and Fall semesters of the 2019 calendar year. Eligibility criteria included being 18 years old or older and speaking English as a first language. Recruited individuals participated in this study in two different settings, depending on the semester during which they participated. During the spring semester of 2019, the study was conducted in a university computer lab with a group of up to 20 participants. During the fall semester of 2019, participants were provided with an internet address allowing them to participate at a time and setting of their choosing. Demographic attributes of the two subsamples are summarized in Table 1.

Table 1

Comparison of Sample Demographics based on Recruitment Semester

	Spring 2019				Fall 2019			
Demographic	*M*	*SD*	*n*	%	*M*	*SD*	*n*	%
Age	19.198	1.123			18.783	0.908		
Gender								
Female			83	68.595			328	71.772
Male			38	31.405			129	28.228
Race/Ethnicity								
African-American/Black			3	2.479			21	4.595
Asian/Asian-American			16	13.223			27	5.908
Hispanic/Latinx/Spanish			25	20.661			61	13.348
White			59	48.760			307	67.177
Multicultural			14	11.570			34	7.440
Other			4	3.306			7	1.532

Demographic differences between the two semesters were expected, given that incoming freshmen more frequently take fall introductory psychology classes, whereas spring courses tend to have more upper class students. Therefore, analyzing the sample as a whole was expected to provide a better demographic representation of the sampled population.

A total of 890 participants were recruited, 614 of whom completed the study. All participants who completed the study received class credit for their participation. Of the participants who completed the study, 17 were excluded from final analysis due to an affirmative response to a screening question about possible impairment of typing ability. Outliers were assessed by visually examining boxplot figures of performance on fluency measures and responses to self-report measures. A total of 14 extreme outliers – participants with scores more than three box-lengths outside the interquartile range – were excluded from final analysis as they were considered to have unfairly manipulated the study or demonstrated lack of engagement. For example, one participant entered 157

words in the first minute of one of the vignette response trials. Such a performance is three times as fast as the average typing speed (51.6 words per minute) and nearly twice as fast as the average speed for the top 10% of typists (89.6 words per minute; Dhakal et al., 2018), increasing the likelihood of artificial inflation of performance. Furthermore, data were removed for five participants who did not provide a single response to one or more of the fluency measures because such performance suggested lack of engagement in the study.

A final sample of 578 participants was used for analysis. Demographics are listed in Table 2. These participants had a mean age of 18.87 years old (*sd* = 0.97, range = 18-23) and were predominantly white (63.322%) and female (71.107%).

Table 2

Demographic Information for Total Sample

Demographic	*M*	*SD*	*Range*	*n*	%
Age	18.870	0.970	18-23		
Gender					
Female				411	71.107
Male				167	28.893
Race/Ethnicity					
African-American/Black				24	4.152
Asian/Asian-American				43	7.439
Hispanic/Latinx/Spanish				86	14.879
White				366	63.322
Multicultural				48	8.304
Other				11	1.903

Materials

Vignettes

The researcher, following a similar format to that used in other solution generation studies (e.g. Del Missier et al., 2015; Kaiser et al., 2013; Nezu & D'Zurilla, 1981), developed two vignettes. These vignettes described problem situations – depression-related symptoms and financial difficulties, respectively – experienced by a hypothetical individual. Vignettes describing situations experienced by a hypothetical other have been found to facilitate increased generation of alternatives compared to vignettes that present the reader as the protagonist (Penn, Spaulding, & Hope, 1993). The depression vignette described an individual experiencing low-mood and anhedonia, struggling to keep up with coursework and social interactions. The financial vignette described an individual with limited financial resources, struggling to pay bills and rent. The order in which is the two vignettes were presented was counterbalanced. Two experimental manipulations were included in the vignettes: protagonist gender and problem labeling. Half of the participants read vignettes describing a male protagonist (John/he/him/his) and the other half read about a female protagonist (Jane/she/her/hers). Similarly, half of the vignettes included explicit labeling of the problem situation (e.g. John is experiencing depression, Jane is experiencing financial difficulties), whereas this brief statement was missing from the other half of the vignettes. All other aspects of the vignettes were identical.

Participants were instructed to read the first vignette presented, then generate ways the protagonist might manage the situation. Instructions included statements encouraging participants to continue generating alternatives until time expired and to

avoid judging and censoring responses they might consider unhelpful. An example vignette and several example responses were provided to reinforce these directions. When ready, participants were provided 30 seconds to read the first vignette after which they had five minutes to generate as many responses as possible. This procedure was then repeated for the second vignette.

After completing both vignette trials, the first vignette was presented again followed by four questions. Two of these questions assessed familiarity with the situation described: a five-point likert-type scale asking the participant to rate their familiarity with the situation and a four-point ordinal scale of the participant's self-assessed proximity to situations similar to the vignette ("I have personally experienced a situation similar to this" to "Neither I, nor anyone I know, has experienced a situation similar to this."). The sum of these two items was used as a measure of situational familiarity, with higher values indicating greater familiarity with the situation. The other two questions asked participants to imagine they were experiencing the situation described in the vignette and use a five-point likert-type scale to rate how challenging the situation would be and their confidence in being able to effectively manage the situation. Responses to the challenge question were reverse-coded and added to the response value for confidence as a measure of situational problem orientation, with higher values indicating more positive problem orientation.

Quantity and quality of responses to each individual vignette were also measured. Quantity was determined by calculating the sum total of all relevant, non-redundant responses separately for each vignette.

Quality was evaluated by the researcher using a four-point ordinal scale (rated zero to three) to measure the effectiveness of each response in managing the situation presented in the vignette, with three-point responses considered the most beneficial. The best responses were those that identified a specific approach that was likely to have lasting, beneficial effects in managing the problem with minimal undesirable consequences. Two-point responses were those that were likely to be beneficial but may be temporary or lacked specificity. One-point responses were those that were vague and likely to be more harmful than helpful. This category included neutral, "do nothing" responses, since maintaining the status quo (e.g. low mood and isolation in the depression vignette, lack of financial resources and no identified income in the financial vignette) was described as undesirable. Responses received a rating of zero if they described an approach that was illegal, antisocial, or would result in undesirable consequences that were likely to far outweigh any potential benefits.

For the depression vignette, responses received highest ratings if they described an active attempt to manage psychological distress using emotion regulation techniques. Examples of specific emotion regulation skills used within problem-solving therapy generally fit a biopsychosocial framework and include mindfulness, exercise, positive thinking, and seeking social support (Nezu et al., 2013). Such techniques have strong empirical support for managing symptoms of depression within the context of other psychological interventions including behavioral activation (Cuijpers et al., 2007) and cognitive-behavioral therapy (Cuijpers et al., 2013). Therefore, solutions generated that fit this framework were considered three-point responses. In addition, responses identifying seeking professional treatment, including psychologist, psychiatrist, or taking

prescribed medication, were also considered three-point responses. Two-point responses were often vague (e.g. “talk to someone”) or distraction techniques that may be temporary or act as avoidance (e.g. “watch a movie”). However, the latter could be rated three points if it included a description of how the activity could improve the situation or provide a lasting, positive effect (e.g. “watch an uplifting movie” offers a shift in perspective). One-point responses were those that offered no change to the situation (e.g. “keep feeling sad”), were passive (e.g. “wish things would be better), or resulted in considerable change without indication of how the situation would be improved (e.g. “drop out of school”). Descriptions of self-harm, suicide, or illegal activities (e.g. “take drugs”) received zero points. To measure intra-rater reliability, alternatives for a subsample of 50 participants were re-rated three weeks after initial ratings and a reliability analysis was conducted comparing the sum total ratings of alternatives generated for the depression vignette for each participant in this subsample. Intraclass correlation coefficient (ICC) estimates were calculated using a single-measurement, absolute-agreement, two-way mixed-effects model (e.g. Koo & Li, 2016). Results indicated “good” to “excellent” reliability, $ICC = 0.908$, 95% CI [0.829, 0.949].

For the financial vignette, the highest-rated solutions were those that would create a lasting increase in income or decrease in expenses. Examples include descriptions of getting a job (or an additional job), seeking a raise or additional paid hours, engaging in a marketable skill, or seeking to reduce expenditures (e.g. reducing utility usage, seeking lower-cost plans, finding a roommate to share expenses, etc.). Temporary influxes of cash (e.g. bank loans, credit cards, advance on a paycheck, etc.) or delays in payment (e.g. extension on rent/utilities) were considered two-point responses. Any form of gambling

was considered a one-point response due to the greater likelihood of financial losses rather than gains. Similarly, any approach that would have a slow payoff (e.g. stocks) or required a large financial investment (e.g. starting a business, going to college, etc.) was considered a one-point response. Examples of zero-point solutions included illegal activities such as selling drugs, prostitution, or theft, due to the potential for consequences that were likely to outweigh any benefits. To measure intra-rater reliability, alternatives for a subsample of 50 participants were re-rated three weeks after initial ratings and a reliability analysis was conducted comparing the sum total ratings of alternatives generated for the financial vignette of each participant in this subsample. Intraclass correlation coefficient (ICC) estimates were calculated using a single-measurement, absolute-agreement, two-way mixed-effects model (e.g. Koo & Li, 2016). Results indicated "excellent" reliability, $ICC = 0.986$, 95% CI [0.974, 0.992].

Previous studies have used mean effectiveness of solutions generated (e.g. Laborde & Raab, 2013) or the effectiveness rating of the highest-rated response as measures of quality (e.g. Nezu & D'Zurilla, 1980). Neither of these approaches was determined to effectively capture the nature of response quality that facilitates the problem-solving process. Use of the mean had the potential to allow participants who generated fewer responses to attain a higher mean response quality than participants who generated many alternatives. For example, an individual who generated two high-quality responses would have a higher mean quality rating than an individual who generated ten high-quality responses and one poor response. However, having only two responses would restrict the ability to select a best solution compared to having ten potentially good solutions, especially when a multi-faceted response would improve effectiveness.

Regarding use of the best response rating as a measure of quality, again, this would disregard use of a combination of generated solutions as a multi-faceted approach. Furthermore, it was expected that most participants would be able to generate at least one high-quality solution, creating a ceiling effect if best response was used as a measure of quality, negating the usefulness of this measure. For these reasons, both mean response rating and best response rating were considered inappropriate measures for response quality.

Instead, the quantity of good responses per vignette was used as the measure of response quality in analyses. Good responses were those alternatives that received a quality rating of two or three. This approach was selected due to its utility in clinical practice. Within the framework of problem-solving therapy, a decision-making process occurs once a list of alternative approaches has been generated (Nezu et al., 2013). During this process, each alternative is evaluated for its potential effectiveness at solving the problem. Unhelpful responses are discarded and the solution considered most likely to be helpful is selected for implementation. Often, the best solution is a combination of several good approaches. Therefore, having a greater quantity of good solutions would facilitate the selection of a higher-quality approach (Nezu et al., 2013).

Alternate Uses Task

The alternate uses task is a performance measure instructing individuals to generate unique uses for a common item. Research suggests that the cognitive process used to generate these responses relies on creativity rather than memory and is engaged when familiar responses are unavailable or exhausted (Del Missier et al., 2015; Gilhooly et al., 2007). Three trials were presented in the current study using stimuli of a brick, a

staple, and a car tire, in accordance with the stimuli used by Del Missier et al. (2015). Participants were provided three minutes per item to generate alternative uses. This task was scored according to total number of realistic, non-redundant uses generated for each object. The sum total quantity of generated uses across the three trials was used for further analyses.

Verbal Fluency

Verbal fluency tasks are performance measures instructing individuals to generate as many words as possible that fit a given constraint. Verbal fluency tasks require generation of responses from memory and likely require similar processes to those used when generating solutions to familiar situations (Del Missier et al., 2015). In accordance with procedures used in research literature, both category fluency and letter fluency tasks were administered (Del Missier et al., 2015; Kaiser et al., 2013; Schweizer et al., 2016). For the letter fluency task, participants were provided a letter and asked to generate words that started with that letter. The category fluency task instructed participants to generate as many words as possible that belonged to a certain category. The letters used in the current study were "S" and "F" and the categories were "animals" and "fruits," to replicate previous methodology (Del Missier et al., 2015; Kaiser et al., 2013; Schweizer et al., 2016). Participants were instructed that proper names (e.g. Michael, Milwaukee) and multiple variations of a word (e.g. "stars" in addition to "star") would not be accepted. One minute was provided for each trial. Each trial was scored according to the number of valid, non-redundant responses. The sum total quantity of generated responses was used in further analyses.

Depression Anxiety Stress Scale (DASS; Lovibond & Lovibond, 1995)

The DASS is a 42-item self-report measure of depression, anxiety, and stress symptoms. Items are answered using a four-point scale to indicate degree to which the respondent agrees with each symptom statement. Each subscale consists of 14 items. As previously noted, depression has been associated with impairment in generating solutions, whereas anxiety shows minimal effect (Marx et al., 1992). In addition, given that generating solutions for depression is particularly relevant to individuals who may be experiencing depressive symptoms, only the depression subscale of the DASS was used for analysis. Confirmatory factor analysis has confirmed that the depression, anxiety, and stress subscales of the DASS represent separate constructs (Crawford & Henry, 2003). In addition, each scale demonstrated adequate convergent validity with other measures of the same construct and good to excellent levels of reliability for the depression, anxiety, and stress scales (α = 0.91, α = 0.84, and α = 0.90, respectively; Lovibond & Lovibond, 1995).

Cognitive Flexibility Inventory (CFI, Dennis & Vander Wal, 2010)

The CFI is a 20-item self-report questionnaire developed to measure an individual's potential for challenging maladaptive cognitions (Dennis & Vander Wal, 2010). Its two subscales evaluate concepts that are of particular interest in problem solving: problem orientation and ability to generate alternatives. The Control subscale consists of seven items "designed to measure the tendency to perceive difficult situations as controllable" (Dennis & Vander Wal, 2010, p. 248), analogous to the concept of problem orientation described by Nezu et al. (2013). The Alternatives subscale consists of 13 items evaluating perceived ability to generate multiple alternative solutions to difficult situations. Items are answered on a 7-point Likert-type scale according to the

extent that they accurately describe the respondent's approach to challenging situations. Dennis and Vander Wal (2010) reported good to excellent internal consistency using Cronbach's alpha at time points seven weeks apart for the total CFI (time 1 $\alpha = 0.90$; time 2 $\alpha = 0.91$), Alternatives subscale (time 1 $\alpha = 0.91$; time 2 $\alpha = 0.91$), and Control subscale (time 1 $\alpha = 0.86$; time 2 $\alpha = 0.84$). They reported test-retest reliability after 7 weeks was high for the Total CFI score ($r = 0.81$, $p < 0.001$) and for both the Alternatives ($r = 0.75$, $p < 0.001$) and Control ($r = 0.77$, $p < 0.001$) subscales.

Procedure

Institutional approval was attained from the Marquette University Institutional Review Board prior to recruiting participants and conducting research. Participants recruited during Spring, 2019 signed up for a date and time to meet in a designated computer lab to participate in the study. Groups of up to 20 participants engaged in the study at the same time. All participants received an informed consent form with a brief description of the study, explanation of risks and benefits, contact information for university mental health resources, and contact information for the principal investigator and faculty advisor. Participants recruited during Fall, 2019 were provided a web address to participate in the study at their convenience. They were instructed to dedicate one hour to complete the study and encouraged to find a time and place that would minimize distractions and external stimuli. The change in administration procedure was intended to increase accessibility to the study, increasing participation in order to meet recruitment goals.

All instructions and measures were presented in an online survey format that was created using Qualtrics software. Measures were presented in the following order:

Demographic questions, vignettes, vignette questions, AUT, letter fluency, category fluency, DASS, CFI. A final question asked participants to indicate whether they experienced any impairment (e.g. physical injury) to their ability to type. The Qualtrics software was set up to randomly assign participants to receive one of four vignette variants differing by labeling (label vs. no label) and protagonist gender (male or female). In addition, Qualtrics was also used to ensure an equal distribution of participants to each vignette variant, based on participant gender (i.e. – if 100 males enrolled in the study, they would be assigned to vignette variants such that 25 males would end up in each of the four variant groups). Vignette situation was counterbalanced so that half of the participants received the depression vignette before the financial vignette, and the other half received the opposite presentation. During the vignette trials, responses generated during the first minute of each trial were saved in addition to the total responses generated. Data for all measures were automatically saved to an online database that was downloaded as an SPSS dataset for analysis. Participants during the Spring received written confirmation of their participation to give to class instructors to receive course credit. Participants during the Fall semester were directed to a separate survey page upon completion of the research measures. These participants entered their name, email, and professor's name into this separate form, allowing the investigator to notify professors of those individuals who should receive course credit.

Data Cleaning

Responses to the free-response measures (e.g. vignettes, AUT, fluency measures) were reviewed for redundant, repetitive, or invalid responses. Responses were considered repetitive when two or more responses used identical or nearly identical words to convey

identical meanings (e.g. “go see a therapist,” and “meet with a therapist”). Responses were considered redundant if they used different words to convey the same meaning (e.g. “go see a therapist,” and “find a psychologist”). Such responses were counted only once, with repetitions and redundancies removed and uncounted. In contrast, some similar responses were not considered redundant. For example, “meet with a psychologist” and “meet with a psychiatrist” were considered unique responses, due to differences in treatment approach between the two professions. Similarly, “ask for help from parents/guardians,” “ask for help from siblings,” “ask for help from friends,” were each considered unique responses due to presumed differences in the nature of each relationship. Responses were considered invalid if they were irrelevant or did not adhere to instructions (e.g. “depression is a serious issue” does not respond to the prompt asking how someone could manage a problem situation). Invalid responses were removed and not counted.

Data Analysis

The overarching purpose of this study was to evaluate the process of generating alternatives for managing depression. To achieve this goal, statistical analyses were conducted using IBM SPSS Statistics Software version 26. Statistical significance was evaluated at the $\alpha = 0.05$ level.

Relationships Between Alternatives Generation and Variables of Interest

The first research question involved determining whether alternatives generation for managing depression would be associated with similar factors as alternatives generation for other problem situations identified in the literature. A correlational

research design was used to evaluate relationships between variables of interest. The following hypotheses were tested for the depression vignette:

Hypothesis 1a and 1b: Both measures of verbal fluency (letter and category) would be positively associated with total alternatives and good alternatives generated.

Hypothesis 1c: Ideation fluency as measured by the AUT would be positively associated with total alternatives and good alternatives generated.

Hypothesis 1d: Situational familiarity would be positively associated with total alternatives and good alternatives generated.

Hypothesis 1e and 1f: Both measures of problem orientation (situational and general) would be positively associated with total alternatives and good alternatives generated.

Hypothesis 1g: Current depression-related distress as measured by the DASS would be negatively associated with total alternatives and good alternatives generated.

Hypothesis 1h: Total quantity of alternatives generated would be positively associated with quantity of good alternatives generated.

Given that multiple factors were expected to be associated with the quantity of alternatives generated, a hierarchical regression analysis was conducted to evaluate each independent variable's contribution to predicting the total quantity of alternatives generated. In essence, alternatives generation is a fluency task, as the goal is to produce as many responses as possible that fit the presented stimuli. Therefore, it was expected to utilize the same abilities as are engaged in other fluency tasks, resulting in strong relationships with these measures (e.g. Del Missier et al., 2015). Nonetheless, as previously identified, variables such as depression-related distress and familiarity were

also expected to be related to alternatives generation, even after controlling for fluency ability. As such, the following hypotheses were evaluated:

Hypothesis 2: Depression-related distress, situational problem orientation, and situational familiarity will significantly predict the quantity of total and good alternatives generated, after controlling for baseline fluency ability.

Demographic variables of gender and race were dummy-coded and entered into the first step to control for these variables. Fluency measures were entered in the second step to account for baseline generation ability. Depression was entered in the third step and problem orientation measures and familiarity were entered in the fourth step. This model generally follows the hierarchical approach taken by Del Missier et al. (2015). The same hierarchical regression model was used to predict the quantity of good quality responses generated, with one exception: the total quantity of alternatives generated for the vignette being evaluated was entered with other fluency measures in the second step. All other steps remained unchanged from the regression model used for predicting total quantity of alternatives generated.

Group Comparisons

To better understand situational and individual characteristics that may affect alternatives generation, this study utilized a mixed-model experimental design to evaluate differences between groups.

Dependent Variables.

Total Quantity of Alternatives Generated. Total quantity was measured by the sum of all relevant, non-redundant responses of how a vignette protagonist might manage

the situation they were experiencing. All participants repeated this measure for each of the two vignette situations.

Quantity of Good Alternatives Generated. The quantity of good alternatives was measured as the sum of all generated alternatives that received a quality rating of two or three. As with total alternatives, this measure was repeated for each of two vignette situations.

Independent Variables.

Vignette Situation. Two vignette situations were presented: one describing an individual experiencing depression symptoms, the other describing someone experiencing financial troubles. All participants received both of the vignette situations, counterbalanced in the order they were presented. Dependent measures were repeated for each vignette situation; therefore, vignette situation was used as a within-subjects, repeated measure in analyses.

Vignette Labeling. Half of the participants received vignettes with explicit labeling of the problem situation (e.g. “experiencing depression” or “having serious financial problems”). The other half of the participants received vignettes absent of these labels. Vignette labeling (e.g. “label” or “no label”) was used as a between-subjects variable.

Vignette Gender. Half of the participants received vignettes with a male gendered protagonist (e.g. “John,” pronouns: he, him, his) and the other half read vignettes with a female gendered protagonist (e.g. “Jane,” pronouns: she, her, hers). Vignette gender (e.g. “male” or “female” was used as a between-subjects variable.

Participant Gender. Participant gender (e.g. male or female) was used as a between-subjects variable in comparative analyses.

Factors Expected to Influence Perception of Situations as Manageable. Several hypotheses were generated to evaluate factors that may influence the perception of a problem as manageable, affecting alternatives generation. First, the situation itself may be perceived as more or less manageable depending on characteristics of the perceiver. Based on the age of participants in this study (*m* = 18.8 years old) and their enrollment at a university that requires first and second year students to live in residence halls, it was assumed that few of these individuals had first-hand experience with financial difficulties that may result in eviction and may struggle when generating alternatives for this situation. In contrast, the prevalence of depression, particularly in college students, increased the likelihood that participants would be familiar with this issue. In addition, participants were recruited for the current study through a psychology research participant pool, typically populated by students enrolled in psychology courses. It was assumed that these students would likely have greater baseline knowledge or interest in mental health issues, including depression. Therefore, main effects of vignette situation were expected.

However, situational fluency has been found to vary by gender. For example, males have been found to demonstrate greater financial literacy and more confidence in their ability to manage financial issues than females, and both genders perceive males as more competent in finance (Driva et al., 2016). In contrast, females have demonstrated greater knowledge of symptoms and management strategies for depression than males. However, both genders rate depression experienced by a female as more difficult to treat

than male-experienced depression (Swami, 2012). Therefore, these perceptions of gendered ability to manage problem situations were expected to influence generation ability depending on the problem situation. So, while gender alone was not expected to affect alternatives generation, interactions between gender (participant gender or protagonist gender) and vignette situation were expected.

Finally, improved problem definition may facilitate improved generation of alternatives. Within the problem-solving framework described by Nezu et al. (2013), a process of clearly identifying the problem is conducted prior to generating alternatives. They proposed that a more specific definition of the problem situation would facilitate improved quantity and quality of solutions in the alternatives generation process (Nezu & D'Zurilla, 1981). Inclusion of problem labels in vignettes in the current study was intended to provide a clearer definition of the problem at hand for participants who received the labels. However, given the perception that female-experienced depression is more difficult to manage than male-experienced depression, this label may not be helpful (and possibly counterproductive) in facilitating generation of alternatives. Based on these considerations, the following hypotheses were proposed:

Hypothesis 3a (total alternatives) and 3b (good alternatives): A three-way interaction between vignette situation, problem labeling, and protagonist gender would be found such that a greater quantity of total and good alternatives would be generated for vignette situations with problem labels than without, except for the female-gendered depression vignette in which no effect of labeling was expected.

Hypothesis 4a (total alternatives) and 4b (good alternatives): A two-way interaction effect between participant gender and vignette situation would be found such

that males generated more total and good alternatives for the financial vignette than females, while females generated a greater quantity of total and good alternatives for the depression vignette compared to males.

A four-way, mixed-model, multivariate ANOVA was conducted to evaluate the hypothesized interactions and simple effects (hypotheses 2 and 3). If the hypothesized interaction was not statistically significant, lower-order interactions and main effects were evaluated. Total alternatives and quantity of good alternatives were entered as the dependent variables. These measures were repeated for both vignette situations making vignette situation a within-subjects independent variable with two levels (depression vignette and financial vignette). Between-subjects independent variables were problem labeling (two levels: labeled or no label), participant gender (two levels: male or female), and protagonist gender (two levels: male or female).

Results

Preliminary Analysis

Independent-samples t-tests were run to determine statistical differences and effect sizes of any differences between semester for independent and dependent variables. Results are presented in Table 3 and Table 4, respectively. Participants in the spring semester produced statistically significantly fewer responses for the letter fluency task, $t(576) = -2.013$, $p = 0.045$, but significantly more responses for the alternate uses task than fall-semester participants, $t(576) = 2.607$, $p = 0.009$. Furthermore, spring-semester participants endorsed a more positive problem orientation toward depression than

Table 3

t-Test and Effect Size of Differences between Recruitment Semester for Independent Variables

	Spring 2019		Fall 2019			
Variable	*M*	*SD*	*M*	*SD*	*t-test*	*Cohen's d*
Letter Fluency	27.636	7.123	29.228	7.884	**-2.013***	-0.212
Category Fluency	29.959	6.557	29.650	6.708	0.452	0.047
Alternate Uses Task	21.678	9.056	19.376	8.519	**2.607****	0.262
CFI Control	31.737	7.535	31.705	7.492	0.042	0.004
DASS Depression	7.491	7.716	7.515	8.698	-0.026	-0.003
Depression Vignette						
Problem Orientation	5.319	1.490	4.985	1.355	**2.223***	0.235
Familiarity	6.345	1.829	6.545	1.874	-1.044	-0.108
Financial Vignette						
Problem Orientation	4.739	1.487	4.595	1.411	0.983	0.099
Familiarity	4.328	1.818	4.416	1.817	-0.471	-0.048

*$p < 0.05$, **$p < 0.01$

Table 4

t-Test and Effect Size of Differences between Recruitment Semester for Dependent Variables

	Spring 2019		Fall 2019			
Variable	*M*	*SD*	*M*	*SD*	*t-test*	*Cohen's d*
Depression Vignette						
Total Alternatives	14.174	6.343	12.733	6.256	**2.246***	0.229
Good Alternatives	13.281	5.989	11.551	5.703	**2.935****	0.296
Financial Vignette						
Total Alternatives	12.587	5.344	11.766	5.292	1.514	0.154
Good Alternatives	10.521	4.262	9.619	4.170	**2.104***	0.214

*$p < 0.05$, **$p < 0.01$

participants in the fall, $t(172.23) = 2.223$, $p = 0.028$.[1] Finally, regarding outcome variables, statistically significant differences were found indicating that spring-semester participants generated a greater quantity of total ($t(576) = 2.246$, $p = 0.025$) and good alternatives ($t(576) = 2.935$, $p = 0.003$) for the depression vignette, and a greater quantity of good alternatives for the financial vignette ($t(576) = 2.104$, $p = 0.036$) than did

[1] The assumption of homogeneity of variances was violated for depression problem orientation, as assessed by Levene's test for the equality of variances ($p = 0.034$); therefore, Welch's *t*-test was used.

participants in the fall. Despite these statistically significant differences between subsamples, effect sizes for the differences were small (between 0.212 and 0.296) suggesting little practical difference between the two subsamples (e.g. Cohen, 1988). Therefore, further analyses were conducted using the combined participant sample in order to achieve greater statistical power and improved representativeness of the population from which participants were sampled.

Descriptive Statistics

Descriptive statistics of mean, standard deviation, and range were calculated for each variable of interest. A summary of these statistics are found in Table 5. In order to provide reference for how the current sample performed on these measures, results from selected studies with similar sample characteristics are presented for comparison.

Table 5

Descriptive Statistics for Independent Variables

Variable	*M*	*SD*	Range
Letter Fluency	28.894	7.752	9-59
Category Fluency	29.715	6.672	10-55
Alternate Uses Task	19.858	8.677	3-52
CFI Control	31.712	7.494	7-49
DASS Depression	7.510	8.499	0-40
Depression Vignette			
Familiarity	6.503	1.865	2-9
Problem Orientation	5.054	1.389	2-10
Financial Vignette			
Familiarity	4.398	1.816	2-9
Problem Orientation	4.625	1.427	2-10

Participants in the current study produced an average of 14.5 valid responses for each letter fluency prompt (*M sum* = 28.894 over two prompts) and 15 valid responses per

category prompt (*M sum* = 29.715 over two prompts). A comparable research design found that a sample with similar age and education characteristics (*n* = 242; age 16-59; greater than 12 years of education) produced about 15 responses per letter prompt (*m sum* = 44.7 responses over three prompts) and 22 responses per category prompt (*m sum* = 21.9 over one prompt) (Tombaugh et al., 1999). Participants in the current study produced an average of about 6.5 valid responses per trial of the Alternate Uses Task (*M sum* = 19.858 over three trials), slightly more than the 5 to 6 responses produced by undergraduate psychology students in another recent study (*N* = 144, *M* age = 18.73 years, *M AUT* = 5.17 to 5.75 per trial based on instruction content) (George & Wiley, 2020). A comparable sample of university undergraduates was used to validate the CFI (*M* age = 20.20 & 20.36 years per respective time point), with mean scores on the control subscale of 35.36 (*N* = 196) and 35.92 (*N* = 152) at two different time points (Dennis & Vander Wal, 2010). Finally, the mean level of depression-related distress in the current study was in the "normal" range and similar to those found in the university sample used to validate the DASS (*N* = 717, *M* age = 21.0 years, *M* depression subscale = 7.19) (Lovibond & Lovibond, 1995). Based on these comparisons, participants in the current study appeared to perform comparably to samples from selected representative studies on utilized measures.

Relationships Between Variables of Interest

Pearson product-moment correlations were run to determine the relationships between output measures (total alternatives generated and good alternatives generated) and letter fluency, category fluency, ideation fluency, depression-related distress, situation familiarity, general problem orientation (CFI Control), and situational problem

orientation. These correlations were conducted for both vignettes. Results for each hypothesis are described below. Descriptive statistics and correlation coefficients for all variables and their relationships are in Table 6.

Hypothesis 1a: There was a significant positive relationship between letter fluency and total alternatives generated ($r = 0.299$, $n = 578$, $p < 0.001$) and good alternatives generated ($r = 0.282$, $n = 578$, $p < 0.001$) for the depression vignette, supporting this hypothesis.

Hypothesis 1b: There was a significant positive relationship between category fluency and total alternatives generated ($r = 0.322$, $n = 578$, $p < 0.001$) and good alternatives generated ($r = 0.271$, $n = 578$, $p < 0.001$) for the depression vignette, supporting this hypothesis.

Hypothesis 1c: There was a significant positive relationship between ideation fluency and total alternatives generated ($r = 0.574$, $n = 578$, $p < 0.001$) and good alternatives generated ($r = 0.547$, $n = 578$, $p < 0.001$) for the depression vignette, supporting this hypothesis.

Hypothesis 1d: There was a significant positive relationship between situational familiarity and total alternatives generated ($r = 0.099$, $n = 576$, $p = 0.017$) and good alternatives generated ($r = 0.098$, $n = 576$, $p = 0.019$) for the depression vignette, supporting this hypothesis.

Table 6

Correlations Between Variables of Interest

Measure	1	2	3	4	5	6	7	8
Depression Vignette								
1. Total Quantity of Alternatives								
2. Quantity of Good Alternatives	**0.945*** **							
3. Letter Fluency	**0.299*** **	**0.282*** **						
4. Category Fluency	**0.322*** **	**0.271*** **	**0.499*** **					
5. Alternate Uses Task Fluency	**0.574*** **	**0.547*** **	**0.325*** **	**0.355*** **				
6. Situation Problem Orientation	0.025	0.022	-0.043	-0.006	0.050			
7. Situation Familiarity	**0.099***	**0.098***	0.021	**0.101***	**0.102***	**-0.099***		
8. CFI Control	0.034	0.001	**0.092***	**0.103***	0.080	**0.236*** **	**-0.227*** **	
9. DASS Depression	**0.098***	**0.085***	0.000	-0.001	**0.097***	**-0.135** **	**0.465*** **	**-0.445*** **
Note. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$								
Financial Vignette								
1. Total Quantity of Alternatives								
2. Quantity of Good Alternatives	**0.866*** **							
3. Letter Fluency	**0.300*** **	**0.279*** **						
4. Category Fluency	**0.358*** **	**0.347*** **	**0.499*** **					
5. Alternate Uses Task Fluency	**0.575*** **	**0.524*** **	**0.325*** **	**0.355*** **				
6. Situation Problem Orientation	-0.009	-0.016	-0.029	**-0.083***	0.070			
7. Situation Familiarity	-0.013	0.024	-0.071	-0.062	0.008	0.075		
8. CFI Control	0.074	**0.098***	**0.092***	**0.103***	0.080	**0.207*** **	-0.049	
9. DASS Depression	**0.084***	0.003	0.000	-0.001	**0.097***	-0.062	**0.159*** **	**-0.445*** **
Note. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$								

Hypothesis 1e: There was no significant relationship between situational problem orientation and total alternatives generated ($r = 0.025$, $n = 576$, $p = 0.557$) and good alternatives generated ($r = 0.022$, $n = 576$, $p = 0.605$) for the depression vignette.

Hypothesis 1f: There was no significant relationship between general problem orientation and total alternatives generated ($r = 0.034$, $n = 569$, $p = 0.425$) and good alternatives generated ($r = 0.001$, $n = 569$, $p = 0.986$) for the depression vignette.

Hypothesis 1g: There was a significant positive relationship between depression related distress and total alternatives generated ($r = 0.098$, $n = 563$, $p = 0.020$) and good alternatives generated ($r = 0.085$, $n = 563$, $p = 0.043$) for the depression vignette, contrary to the hypothesis that a negative relationship would exist.

Hypothesis 1h: There was a significant positive relationship between total quantity of alternatives generated and quantity of good alternatives ($r = 0.945$, $n = 578$, $p < 0.001$), supporting this hypothesis.

Hypothesis 2: Hierarchical linear regression analyses were conducted to predict total alternatives generated and good alternatives generated for both vignettes. Multicollinearity was evaluated and the variance inflation factor for each variable was determined to be within acceptable levels. Results for the hierarchical analysis of variables predicting total quantity of alternatives for the depression vignette are found in Table 7. When predicting the total alternatives generated for the depression vignette, the control variables (gender and race/ethnicity) contributed significantly to the regression model, F (6, 545) = 6.972, $p < 0.001$, accounting for 7.1% of the variance in total alternatives. Introduction of fluency measures explained an additional 30.7% of the variance and this change in R^2 was significant, F (3, 542) = 89.286, $p < 0.001$. Inclusion

of depression did not add significantly to the model, F (1, 541) = 2.955, p = 0.086, nor did addition of problem orientation measures and familiarity, F (3, 538) = 0.451, p = 0.717. The final model explained 38.3% of the variance in total alternatives generated for the depression vignette. Letter fluency (β = 0.084, t = 2.084, p = 0.038) and ideation fluency (β = 0.505, t = 13.407, p < 0.001) were the only significant predictors of total generated alternatives in the final model.

Results for the financial vignette were similar and can be found in Table 8. The control variables contributed significantly to the regression model, F (6, 545) = 5.281, p < 0.001, and accounted for 5.5% of the variance in total alternatives. Inclusion of fluency measures resulted in a significant change in R^2, explaining an additional 32.3% of the variance, F (3, 542) = 93.667, p < 0.001. Including depression did not add significantly to the model, F (1, 541) = 1.242, p = 0.265, nor did addition of problem orientation and familiarity measures, F (3, 538) = 0.956, p = 0.413. The final model explained 38.2% of the variance in total alternatives generated for the financial vignette. Category fluency (β = 0.137, t = 3.258, p = 0.001) and ideation fluency (β = 0.494, t = 13.098, p < 0.001) were the only significant predictors of total alternatives generated in the final model.

The same regression models were used for predicting quantity of good alternatives generated for both vignettes, except that total number of alternatives generated was included in step two with the other fluency measures. Results for regression analysis predicting quantity of good alternatives generated for the depression vignette are found in Table 9. For the depression vignette, the control variables (gender and race/ethnicity) contributed significantly to the regression model for quantity of good alternatives generated, F (6, 545) = 7.786, p < 0.001, accounting for 7.9% of the variance

Table 7

Hierarchical Regression Analysis for Predicting Total Alternatives Generated for the Depression Vignette

		Unstandardized Coefficients		Standardized Coefficients						
Step	*Predictor*	*B*	*SE*	*β*	*p*	R^2	ΔR^2	*df*	ΔF	*p*
1						0.071	0.071	6, 545	6.972	< **0.001**
	Gender	-2.551	0.577	-0.183	< **0.001**					
	Race: African American/Black	-1.736	1.318	-0.055	0.188					
	Race: Asian/Asian American	-1.979	1.011	-0.082	0.051					
	Race: Hispanic/Latinx	-1.568	0.766	-0.087	**0.041**					
	Race: Multicultural	2.158	0.960	0.095	**0.025**					
	Race: Other	-4.383	1.874	-0.097	**0.020**					
2						0.378	0.307	3, 542	89.286	< **0.001**
	Gender	-1.776	0.489	-0.128	< **0.001**					
	Race: African American/Black	-0.817	1.093	-0.026	0.455					
	Race: Asian/Asian American	-1.185	0.831	-0.049	0.154					
	Race: Hispanic/Latinx	-0.660	0.642	-0.036	0.305					
	Race: Multicultural	0.471	0.796	0.021	0.554					
	Race: Other	-2.634	1.545	-0.058	0.089					
	Letter Fluency	0.067	0.032	0.083	**0.040**					
	Category Fluency	0.046	0.039	0.048	0.248					
	Alternate Uses Task	0.372	0.027	0.514	< **0.001**					
3						0.382	0.003	1, 541	2.955	0.086
	Gender	-1.767	0.488	-0.127	< **0.001**					
	Race: African American/Black	-0.967	1.094	-0.031	0.377					
	Race: Asian/Asian American	-1.228	0.830	-0.051	0.140					
	Race: Hispanic/Latinx	-0.811	0.647	-0.045	0.211					
	Race: Multicultural	0.353	0.797	0.015	0.658					
	Race: Other	-2.815	1.545	-0.062	0.069					
	Letter Fluency	0.067	0.032	0.083	**0.039**					
	Category Fluency	0.046	0.039	0.049	0.241					
	Alternate Uses Task	0.367	0.027	0.508	< **0.001**					
	DASS Depression	0.044	0.026	0.059	0.086					
4						0.383	0.002	3, 538	0.451	0.717
	Gender	-1.904	0.508	-0.137	< **0.001**					
	Race: African American/Black	-1.009	1.104	-0.032	0.361					
	Race: Asian/Asian American	-1.273	0.834	-0.053	0.128					
	Race: Hispanic/Latinx	-0.830	0.650	-0.046	0.202					
	Race: Multicultural	0.316	0.800	0.014	0.693					
	Race: Other	-2.696	1.558	-0.060	0.084					
	Letter Fluency	0.068	0.033	0.084	**0.038**					
	Category Fluency	0.044	0.040	0.047	0.265					
	Alternate Uses Task	0.365	0.027	0.505	< **0.001**					
	DASS Depression	0.054	0.032	0.072	0.092					
	Depression Problem Familiarity	-0.012	0.132	-0.004	0.926					
	Depression Problem Orientation	0.166	0.162	0.036	0.306					
	CFI Control	0.012	0.034	0.014	0.720					

Note. SE = standard error of *B*. Gender: 1 = female, 2 = male. Race variables: 1 = true, 0 = false.

Table 8

Hierarchical Regression Analysis for Predicting Total Alternatives Generated for the Financial Vignette

		Unstandardized Coefficients		Standardized Coefficients						
Step	*Predictor*	*B*	*SE*	*β*	*p*	R^2	ΔR^2	*df*	ΔF	*p*
1						0.055	0.055	6, 545	5.281	< **0.001**
	Gender	-1.502	0.493	-0.127	**0.002**					
	Race: African American/Black	-0.355	1.128	-0.013	0.753					
	Race: Asian/Asian American	-1.510	0.865	-0.074	0.081					
	Race: Hispanic/Latinx	-1.399	0.656	-0.091	**0.033**					
	Race: Multicultural	2.025	0.821	0.105	**0.014**					
	Race: Other	-4.181	1.603	-0.109	**0.009**					
2						0.378	0.323	3, 542	93.667	< **0.001**
	Gender	-0.647	0.415	-0.055	0.120					
	Race: African American/Black	0.700	0.927	0.026	0.451					
	Race: Asian/Asian American	-0.806	0.705	-0.040	0.254					
	Race: Hispanic/Latinx	-0.535	0.545	-0.035	0.326					
	Race: Multicultural	0.557	0.675	0.029	0.410					
	Race: Other	-2.466	1.311	-0.064	0.060					
	Letter Fluency	0.031	0.028	0.045	0.263					
	Category Fluency	0.117	0.033	0.146	**0.001**					
	Alternate Uses Task	0.304	0.023	0.497	< **0.001**					
3						0.379	0.001	1, 541	1.242	0.265
	Gender	-0.642	0.415	-0.054	0.122					
	Race: African American/Black	0.617	0.930	0.023	0.508					
	Race: Asian/Asian American	-0.829	0.705	-0.041	0.240					
	Race: Hispanic/Latinx	-0.618	0.550	-0.040	0.261					
	Race: Multicultural	0.492	0.678	0.025	0.468					
	Race: Other	-2.566	1.314	-0.067	0.051					
	Letter Fluency	0.031	0.028	0.045	0.262					
	Category Fluency	0.117	0.033	0.146	< **0.001**					
	Alternate Uses Task	0.302	0.023	0.493	< **0.001**					
	DASS Depression	0.024	0.022	0.039	0.265					
4						0.382	0.003	3, 538	0.956	0.413
	Gender	-0.648	0.431	-0.055	0.134					
	Race: African American/Black	0.563	0.945	0.021	0.551					
	Race: Asian/Asian American	-0.839	0.706	-0.041	0.235					
	Race: Hispanic/Latinx	-0.583	0.564	-0.038	0.302					
	Race: Multicultural	0.525	0.680	0.027	0.441					
	Race: Other	-2.582	1.333	-0.067	0.053					
	Letter Fluency	0.029	0.028	0.042	0.294					
	Category Fluency	0.110	0.034	0.137	**0.001**					
	Alternate Uses Task	0.303	0.023	0.494	< **0.001**					
	DASS Depression	0.036	0.025	0.057	0.148					
	Financial Problem Familiarity	-0.033	0.106	-0.011	0.758					
	Financial Problem Orientation	-0.183	0.135	-0.049	0.174					
	CFI Control	0.032	0.029	0.045	0.263					

Note. SE = standard error of *B*. Gender: 1 = female, 2 = male. Race variables: 1 = true, 0 = false.

in total alternatives. Introducing fluency measures to the model produced a significant change in R^2, explaining an additional 81.7% of the variance, F (4, 541) = 1,057.928, p < 0.001. Inclusion of depression did not add significantly to the model, F (1, 540) = 0.306, p = 0.580, nor did addition of problem orientation measures and familiarity, F (3, 537) = 1.652, p = 0.176. The final model explained 89.7% of the variance in quantity of good alternatives generated for the depression vignette. Category fluency (β = -0.066, t = -3.837, p < 0.001), total alternatives generated (β = 0.933, t = 52.810, p < 0.001), and global problem orientation as measured by CFI control (β = -0.035, t = -2.152, p = 0.032) were significant predictors of quantity of good alternatives generated in the final model.

Results for the financial vignette are found in Table 10. For this vignette the control variables contributed significantly to the regression model, F (6, 545) = 7.494, p < 0.001, and accounted for 7.6% of the variance in total alternatives. Inclusion of fluency measures resulted in a significant change in R^2, explaining an additional 68.9% of the variance, F (4, 541) = 396.049, p < 0.001. Including depression added significantly to the model, F (1, 540) = 11.002, p = 0.001, explaining an additional 0.5% of the variance. Problem orientation and familiarity measures did not significantly contribute to the regression model, F (3, 537) = 2.370, p = 0.070. The final model explained 77.3% of the variance in quantity of good alternatives generated for the financial vignette. Total quantity of alternatives generated (β = 0.836, t = 31.923, p < 0.001), depression-related distress (β = -0.069, t = -2.892, p = 0.004), and situational familiarity (β = 0.055, t = 2.527, p = 0.012) were significant predictors of quantity of good alternatives generated in the final model.

Table 9

Hierarchical Regression Analysis for Predicting Good Alternatives Generated for the Depression Vignette

		Unstandardized Coefficients		Standardized Coefficients						
Step	*Predictor*	*B*	*SE*	*β*	*p*	R^2	ΔR^2	*df*	ΔF	*p*
1						0.079	0.079	6, 545	7.786	< **0.001**
	Gender	-2.724	0.528	-0.213	< **0.001**					
	Race: African American/Black	-1.643	1.207	-0.057	0.174					
	Race: Asian/Asian American	-1.243	0.926	-0.056	0.180					
	Race: Hispanic/Latinx	-1.410	0.702	-0.085	**0.045**					
	Race: Multicultural	1.921	0.879	0.092	**0.029**					
	Race: Other	-4.088	1.716	-0.098	**0.018**					
2						0.896	0.817	4, 541	1057.928	< **0.001**
	Gender	-0.691	0.187	-0.054	< **0.001**					
	Race: African American/Black	-0.364	0.412	-0.013	0.378					
	Race: Asian/Asian American	0.446	0.314	0.020	0.156					
	Race: Hispanic/Latinx	-0.147	0.242	-0.009	0.544					
	Race: Multicultural	0.053	0.300	0.003	0.860					
	Race: Other	-0.484	0.584	-0.012	0.408					
	Letter Fluency	0.014	0.012	0.019	0.242					
	Category Fluency	-0.060	0.015	-0.069	< **0.001**					
	Alternate Uses Task	0.019	0.012	0.028	0.110					
	Total Alternatives Generated	0.857	0.016	0.932	< **0.001**					
3						0.896	0.000	1, 540	0.306	0.580
	Gender	-0.691	0.187	-0.054	< **0.001**					
	Race: African American/Black	-0.345	0.414	-0.012	0.405					
	Race: Asian/Asian American	0.452	0.315	0.020	0.151					
	Race: Hispanic/Latinx	-0.128	0.245	-0.008	0.600					
	Race: Multicultural	0.067	0.302	0.003	0.824					
	Race: Other	-0.460	0.586	-0.011	0.433					
	Letter Fluency	0.014	0.012	0.019	0.244					
	Category Fluency	-0.060	0.015	-0.069	< **0.001**					
	Alternate Uses Task	0.019	0.012	0.029	0.105					
	Total Alternatives Generated	0.858	0.016	0.933	< **0.001**					
	DASS Depression	-0.005	0.010	-0.008	0.580					
4						0.897	0.001	3, 537	1.652	0.176
	Gender	-0.609	0.194	-0.048	**0.002**					
	Race: African American/Black	-0.231	0.417	-0.008	0.579					
	Race: Asian/Asian American	0.452	0.315	0.020	0.152					
	Race: Hispanic/Latinx	-0.102	0.245	-0.006	0.677					
	Race: Multicultural	0.060	0.301	0.003	0.842					
	Race: Other	-0.601	0.589	-0.014	0.308					
	Letter Fluency	0.016	0.012	0.022	0.184					
	Category Fluency	-0.057	0.015	-0.066	< **0.001**					
	Alternate Uses Task	0.021	0.012	0.031	0.084					
	Total Alternatives Generated	0.858	0.016	0.933	< **0.001**					
	DASS Depression	-0.018	0.012	-0.027	0.130					
	Depression Problem Familiarity	0.026	0.050	0.008	0.596					
	Depression Problem Orientation	0.032	0.061	0.008	0.598					
	CFI Control	-0.028	0.013	-0.035	**0.032**					

Note. SE = standard error of *B*. Gender: 1 = female, 2 = male. Race variables: 1 = true, 0 = false.

Table 10

Hierarchical Regression Analysis for Predicting Good Alternatives Generated for the Financial Vignette

		Unstandardized Coefficients		Standardized Coefficients						
Step	*Predictor*	*B*	*SE*	*β*	*p*	R^2	ΔR^2	*df*	ΔF	*p*
1						0.076	0.076	6, 545	7.494	< **0.001**
	Gender	-1.869	0.385	-0.201	< **0.001**					
	Race: African American/Black	-0.503	0.880	-0.024	0.568					
	Race: Asian/Asian American	-0.633	0.675	-0.039	0.349					
	Race: Hispanic/Latinx	-1.330	0.512	-0.110	**0.010**					
	Race: Multicultural	1.626	0.641	0.106	**0.011**					
	Race: Other	-2.800	1.251	-0.093	**0.026**					
2						0.765	0.689	4, 541	396.049	< **0.001**
	Gender	-0.848	0.202	-0.091	< **0.001**					
	Race: African American/Black	-0.222	0.451	-0.011	0.622					
	Race: Asian/Asian American	0.395	0.343	0.025	0.250					
	Race: Hispanic/Latinx	-0.392	0.265	-0.032	0.140					
	Race: Multicultural	0.211	0.328	0.014	0.521					
	Race: Other	0.031	0.639	0.001	0.961					
	Letter Fluency	-0.006	0.013	-0.012	0.635					
	Category Fluency	0.009	0.016	0.014	0.591					
	Alternate Uses Task	0.017	0.013	0.035	0.181					
	Total Alternatives Generated	0.657	0.021	0.832	< **0.001**					
3						0.770	0.005	1, 540	11.002	**0.001**
	Gender	-0.853	0.200	-0.092	< **0.001**					
	Race: African American/Black	-0.106	0.448	-0.005	0.814					
	Race: Asian/Asian American	0.431	0.340	0.027	0.205					
	Race: Hispanic/Latinx	-0.271	0.265	-0.022	0.308					
	Race: Multicultural	0.303	0.327	0.020	0.354					
	Race: Other	0.183	0.635	0.006	0.774					
	Letter Fluency	-0.007	0.013	-0.012	0.620					
	Category Fluency	0.008	0.016	0.013	0.625					
	Alternate Uses Task	0.020	0.013	0.040	0.124					
	Total Alternatives Generated	0.660	0.021	0.836	< **0.001**					
	DASS Depression	-0.035	0.011	-0.070	**0.001**					
4						0.773	0.003	3, 537	2.370	0.070
	Gender	-0.850	0.207	-0.091	< **0.001**					
	Race: African American/Black	-0.302	0.453	-0.014	0.505					
	Race: Asian/Asian American	0.409	0.339	0.025	0.228					
	Race: Hispanic/Latinx	-0.428	0.271	-0.035	0.114					
	Race: Multicultural	0.230	0.327	0.015	0.481					
	Race: Other	0.127	0.642	0.004	0.843					
	Letter Fluency	-0.006	0.013	-0.012	0.627					
	Category Fluency	0.008	0.016	0.013	0.626					
	Alternate Uses Task	0.018	0.013	0.037	0.159					
	Total Alternatives Generated	0.660	0.021	0.836	< **0.001**					
	DASS Depression	-0.035	0.012	-0.069	**0.004**					
	Financial Problem Familiarity	0.129	0.051	0.055	**0.012**					
	Financial Problem Orientation	-0.006	0.065	-0.002	0.929					
	CFI Control	0.010	0.014	0.018	0.471					

Note. SE = standard error of *B*. Gender: 1 = female, 2 = male. Race variables: 1 = true, 0 = false.

Group Comparisons

A four-way, mixed multivariate analysis of variance was conducted to evaluate effects of vignette situation, problem labeling, protagonist gender, and participant gender on both measures of alternatives generation.

Hypothesis 2a: Three-way interaction effect of vignette situation, problem labeling, and protagonist gender on total alternatives generated. There was a statistically significant three-way interaction between vignette situation, problem labeling, and protagonist gender, $F(1, 570) = 4.534$, $p = 0.034$, $\eta^2 = 0.008$. Statistical significance of a simple two-way interaction was accepted at the Bonferonni-adjusted alpha level of $p < 0.025$. There was a statistically significant simple two-way interaction between problem labeling and protagonist gender for the financial situation, $F(1, 574) = 5.845$, $p = 0.016$, but not for the depression situation, $F(1, 574) = 0.007$, $p = 0.936$. Statistical significance of a simple simple main effect was accepted at the Bonferonni-adjusted alpha level of $p < 0.025$. There was a simple simple main effect of problem labeling for financial vignettes with a male protagonist, $F(1, 574) = 8.835$, $p = 0.003$, but not for financial vignettes with a female protagonist, $F(1, 574) = 0.249$, $p = 0.618$. Pairwise comparisons were performed with Bonferroni corrections for statistically significant simple simple main effects. A greater number of alternatives was generated for the financial vignette with a male protagonist when the problem was labeled ($M = 12.966$, $SD = 5.145$) compared to unlabeled ($M = 11.157$, $SD = 5.510$), a mean difference of 1.809, 95% CI [0.614, 3.005]. Results are represented in Figure 1.

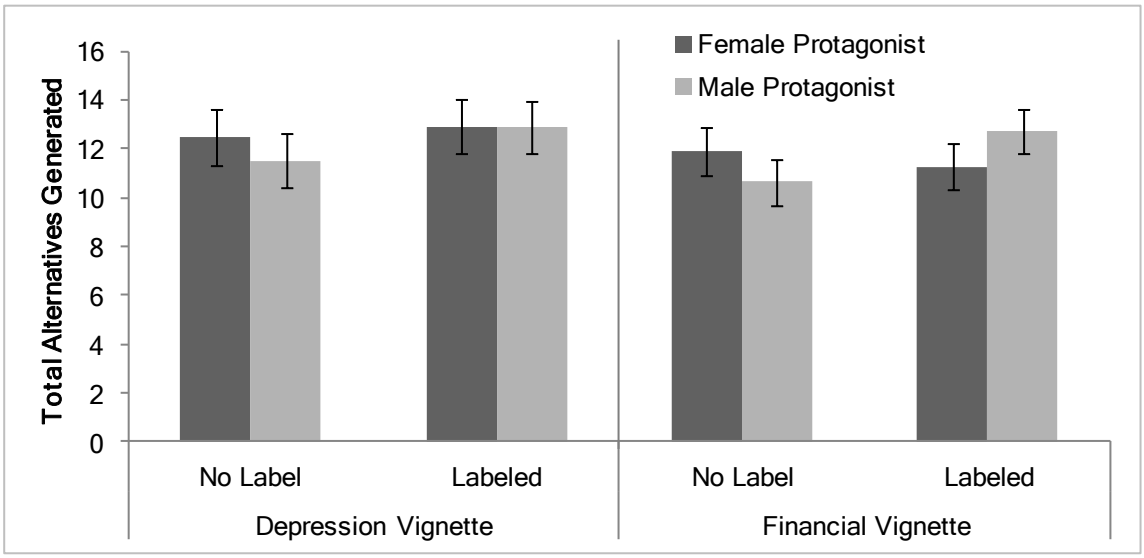
Hypothesis 2b: Three-way interaction effect of vignette situation, problem labeling, and protagonist gender on quantity of good alternatives generated. The

interaction effect of situation, labeling, and protagonist gender on quantity of good alternatives was not significant, $F(1, 570) = 1.520$, $p = 0.218$, partial $\eta^2 = 0.003$. The effects of two-way interactions between these variables on quantity of good alternatives were also not significant ($p > 0.05$).

Hypothesis 3a: Two-way interaction effect between participant gender and vignette situation on total alternatives generated. There was a statistically significant two-way interaction between vignette situation and participant gender on total alternatives

Figure 1

Interaction Effect of Problem Situation, Problem Labeling, and Protagonist Gender on Total Alternatives Generated



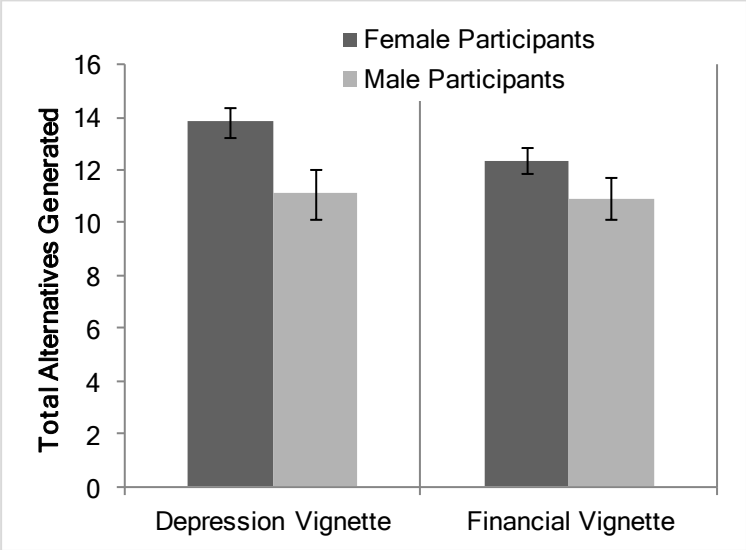
generated, $F(1, 570) = 9.998$, $p = 0.002$, $\eta^2 = 0.017$. Statistical significance of a simple two-way interaction was accepted at the Bonferonni-adjusted alpha level of $p < 0.025$. There was a statistically significant simple main effect of vignette situation on female participants, $F(1, 570) = 44.539$, $p < 0.001$, but not males, $F(1, 570) = 0.249$, $p = 0.618$. Pairwise comparisons were performed with Bonferroni corrections for statistically

significant simple main effects. Females generated a greater quantity of total alternatives for the depression vignette (M = 13.827, SD = 6.528) than the financial vignette (M = 12.363, SD = 5.354), a mean difference of 1.463 (95% CI [1.033, 1.894], $p < 0.001$). Results are represented in Figure 2.

Hypothesis 3b: Two-way interaction effect between participant gender and vignette situation on quantity of good alternatives generated. There was a statistically significant two-way interaction between vignette situation and participant gender on

Figure 2

Interaction Effect of Problem Situation and Participant Gender on Total Quantity of Alternatives Generated

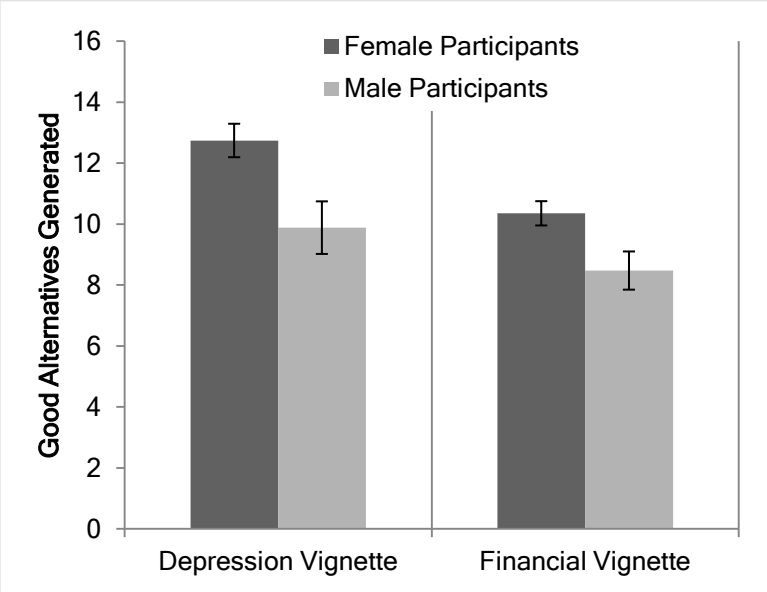


quantity of good alternatives generated, $F(1, 570) = 5.519$, $p = 0.019$, partial $\eta^2 = 0.010$. Statistical significance of a simple main effect was accepted at Bonferroni-adjusted alpha level of $p < 0.025$. There was a statistically significant simple main effect of gender for the depression situation, $F(1, 570) = 30.895$, $p < 0.001$, and for the financial situation, $F(1, 570) = 25.344$, $p < 0.001$. Pairwise comparisons were performed with Bonferroni

corrections for statistically significant simple main effects. Females generated a greater quantity of good alternatives than males for the depression vignette (estimated mean difference = 2.892, 95% CI [1.870, 3.914], $p < 0.001$) and the financial vignette (estimated mean difference = 1.903, 95% CI [1.160, 2.645], $p < 0.001$). Results are represented in Figure 3.

Figure 3

Interaction Effect of Problem Situation and Participant Gender on Quantity of Good Alternatives Generated



Discussion

The primary goal of this study was to evaluate the process of generating alternative solutions for depression. To achieve this goal, two avenues of inquiry were undertaken. First, analyses were conducted to evaluate relationships between measures of alternatives generation and multiple variables identified in the literature as being related to generating alternatives for problem situations. Second, group comparisons were

examined in order to test empirically-based hypotheses about the effects of influential factors on alternatives generation. Results were expected to improve understanding of the process of generating alternative methods for managing depression.

Findings Summary

Results indicated that measures of verbal fluency and ideation fluency had the strongest relationships with alternatives generation, such that greater fluency was associated with a greater quantity of total alternatives and good alternatives generated for both vignette situations. For the depression vignette, statistically significant, yet weak, positive relationships were found between alternatives generation outcome measures and measures of depression-related distress and familiarity with depression. In contrast, the financial vignette produced a weak, statistically significant positive relationship between a measure of global problem orientation (CFI control) and the quantity of good alternatives generated, and a weak, statistically significant positive relationship between depression-related distress and total quantity of generated alternatives.

Hierarchical regression models indicated that ideation fluency (as measured by the AUT) was the strongest predictor of total alternatives generated for both vignette situations, predicting an increase in total alternatives generated with increases in ideation fluency. In addition, letter fluency positively predicted total alternatives for the depression vignette and category fluency positively predicted total alternatives for the financial vignette at statistically significant levels.

When predicting the quantity of good alternatives generated, the total number of alternatives generated emerged as the strongest predictor in both vignette situations, with a greater quantity of total alternatives predicting a greater quantity of good alternatives

generated. In addition, global problem orientation and category fluency negatively predicted the number of good alternatives generated for the depression vignette at statistically significant levels. Additional statistically significant predictors of quantity of good alternatives for the financial vignette included depression-related distress as a negative predictor and situational familiarity as a positive predictor.

Analysis of group differences indicated a statistically significant three-way interaction effect of vignette situation, problem labeling, and protagonist gender on total alternatives generated. A similar total quantity of alternatives was generated for the depression vignette regardless of the protagonist's gender or inclusion of problem labeling. However, for the financial vignette, more total alternatives were generated for the labeled vignette when the protagonist was male than female. The non-labeled financial vignette showed no such difference. A similar interaction effect between these factors was not found for the quantity of good alternatives generated.

A statistically significant interaction effect was found for participant gender and vignette situation on total alternatives generated. Females generated a greater quantity of alternatives for the depression vignette than the financial vignette, whereas males did not generate differently between vignettes. A similar interaction effect was found on quantity of good alternatives generated, such that females generated a greater quantity of good alternatives than males for both vignettes.

Relationships Between Alternatives Generation and Variables of Interest

Fluency

The association between performance on fluency measures and alternatives generation was expected, supporting findings in the literature (Del Missier et al., 2015;

Kaiser et al., 2013; Schweizer et al., 2016). Furthermore, the stronger association between alternatives generation and ideation fluency supported findings reported by Del Missier et al. (2015). The design of the current study provided participants with five minutes to generate alternatives solutions for each of the problem situations. This was intended to provide a comparable timeframe to when an individual might engage in this problem-solving skill in their daily life or in the context of a therapy session. By being provided with ample time to generate responses, it was expected that participants would exhaust their cache of familiar, quick, memory-based responses and shift to a more associative, creative generation process (e.g. Del Missier et al., 2015). Results indicating alternatives generation being more strongly associated with ideation fluency than verbal fluency measures supported this proposition.

Familiarity

Expected relationships between alternatives generation and situation familiarity were exceptionally weak or not statistically significant. Previous studies that provided support for the relationship between familiarity and alternatives generation allowed 10 seconds or less for generating alternatives (Kaiser et al., 2013; Laborde & Raab, 2013; Schweizer et al., 2016). With such a brief timeframe for generating solutions, the greatest quantity of alternatives would be generated by those who have experience with the situation and are able to quickly draw upon practiced, memory-based responses. When a longer generation period is allowed, there is opportunity to exhaust learned, memory-based responses, subsequently resulting in a shift to a creative process in order to continue generating responses. It is possible that given enough time and enough alternatives generated, any early advantage in generating alternatives begins to lose

meaning, as those memory-based responses become a smaller proportion of the total alternatives generated. Therefore, the longer response period provided during this study likely allowed participants with lesser familiarity with a situation to generate a similar quantity of alternatives as those who had greater familiarity.

An alternative explanation may lie in the nature of the vignettes themselves. A previous study conducted by Del Missier et al. (2015), examined longer response generation periods of six minutes for each of three problem situations. Of these situations, a statistically significant relationship between quantity of alternatives and familiarity was only found for the situation rated as most familiar. They proposed that situational characteristics might differentially influence effects of familiarity on alternatives generation. They offered the example that familiarity with a neighborhood may help facilitate generating a list of lunch options, but familiarity with generating an interesting title for a paper – a task that requires a novel, creative response – is less helpful. At this time, the situational characteristics that influence the relationship between familiarity and alternatives generation remain unclear and offer an avenue for future research.

Problem Orientation

Relationships between measures of problem orientation and alternatives generation were also exceptionally weak or not statistically significant. The expectation of a relationship between these variables was primarily theoretical, based on the problem-solving model developed by Nezu et al. (2013). Prior research found that a more positive problem orientation is related to lower stress and fewer problems (D'Zurilla & Sheedy, 1991) possibly due to more effective implementation of problem solving skills. However,

to the best of this author's knowledge, there has been no study evaluating the direct relationship between problem orientation and alternatives generation.

Problem orientation is defined by Nezu et al. (2013, p.11) as "the set of relatively stable cognitive-affective schemas that represent a person's generalized beliefs, attitudes, and emotional reactions about problems in living and one's ability to successfully cope with such problems." When an individual believes a problem cannot be solved, or doubt their ability to effectively cope with a problem, they may experience emotions such as shame, anxiety, or frustration that result in avoidance behaviors or careless, impulsive attempts to quickly resolve the problem (Nezu et al., 2013). In contrast, maintaining a neutral emotional valence has been associated with generation of a greater quantity of alternatives than if negative or positive affective valence is experienced (Laborde & Raab, 2013).

Although a range of problem orientations was endorsed by participants, the nature of this study may not have evoked the emotional response necessary to trigger behaviors that would have impaired alternatives generation ability. In other words, although some participants endorsed doubts about their ability to effectively cope with problems, these doubts did not translate into emotional or behavioral reactions that impaired their ability to generate alternatives for this study. It is possible that the third-person description of hypothetical situations used in the problem vignettes allowed a level of personal separation that was non-threatening and did not evoke emotional reactions. The use of a third-person perspective in problem vignettes has been found to facilitate greater generation of alternatives than use of first-person perspective (Penn et al., 1993). In that study, the authors suggested that an automatic inhibitory process is engaged when

generating alternatives from a first-person perspective, restricting generated responses to those applicable to their own attributes (e.g. skills, values, etc.), whereas this inhibition is not deployed when considering a third-person perspective. Therefore, use of a third-person perspective may help to avoid the generation impairments that result from low self-efficacy inherent in a negative problem orientation.

Depression-Related Distress

The weak relationship between depression-related distress and alternatives generation was unexpected given the robust literature supporting this relationship. Even more surprising was the positive direction of the relationship, indicating that greater depression was related to a greater quantity of alternatives generated for both vignette situations, rather than the negative relationship identified in previous studies. Although the relationships were very weak ($r < 0.1$), the similar finding between the two vignettes lends evidence that this finding is not spurious. There was a similarly weak, yet statistically significant positive relationship between depression-related distress and ideation fluency as measured by the AUT, indicating that those with higher levels of depression performed better at creative generation.

It could be speculated that participants who endorsed higher levels of depression were more likely to have sought psychotherapy, during which they developed their ability to generate alternatives even if that therapy was not PST. Individuals experiencing depression often demonstrate unrealistically negative views of themselves, others, their environment, and the future (Beck et al., 1979). It is common in psychotherapy for this pessimistic way of thinking to be challenged through a process of generating alternative perspectives for consideration, allowing this ability to be developed through practice.

Group Comparisons

Vignette Situation, Problem Labeling, and Protagonist Gender

Interaction effects were expected between vignette situation, problem labeling, and gender of vignette protagonist on alternatives generation. It was generally expected that problem labeling would improve alternatives generation due to improved problem definition (e.g. Nezu & D'Zurilla, 1981). An exception was expected for the depression vignette when a female protagonist was described. For this situation, the labeling effects were expected to be diminished due to a perception that female-experienced depression is difficult to manage (Swami, 2012). Although a three-way interaction effect was found, the simple effects occurred in the male protagonist financial situation. Problem labeling enhanced the total alternatives generated for this situation compared to the same situation without a problem label. In addition, no interaction effects were found between these variables on quantity of good alternatives generated.

These results indicate that provision of a problem label does not facilitate alternatives generation on a broad scale. Instead, problem labeling may provide selective benefits to alternatives generation in the presence of other situational factors. This suggests a situational nature to when labeling a problem may be helpful, neutral, or harmful for generating alternatives. Future exploration is recommended to identify labeling characteristics that may be helpful or harmful to the problem-solving process.

Vignette Situation and Participant Gender

Interaction effects were expected between vignette situation and participant gender on measures of alternatives generation. Males were expected to generate a greater quantity of total and good alternatives for the financial vignette, whereas females were

expected to generate greater quantities for the depression vignette. Two-way interactions were found between situation and participant gender for both total alternatives generated and quantity of good alternatives generated, but simple main effects were not consistent with hypotheses. Although females did generate a greater quantity of alternatives for the depression vignette than the financial vignette (consistent with expectations), males generated a similar quantity of total alternatives between vignettes. Concerning generation of good alternatives, both genders generated a greater quantity of good alternatives for the depression vignette compared to the financial vignette, and females generated a greater quantity of good alternatives than males in each situation.

Although males did not generate alternatives as expected, the results are not surprising given the characteristics of the sample. Participants were recruited from a psychology participant pool, indicating they were likely enrolled in psychology courses. It could be inferred that these participants were interested in mental health issues and possibly greater depression literacy than peers not taking psychology courses. Furthermore, these individuals were predominantly in their first or second year of college, and as such, it is possible that many were still financially dependent on their parents. These potential factors of enhanced depression literacy and less developed financial literacy compared to what was expected would explain male participants performance.

Limitations

Several factors may affect the internal or external validity of study findings. First, participant characteristics limit the ability to generalize results beyond a select population. The participants in this study were young (mean age = 18.8 years old) college students recruited from psychology classes. It is likely that these individuals had access to or

knowledge of considerable financial and social resources that they could use to manage or overcome problems. For example, many participants identified "going to the campus counseling center" as a response to the depression vignette. The counseling center on campus provides psychotherapeutic interventions to enrolled students at no cost. In contrast, cost and availability are identified as the primary structural obstacles to seeking professional mental health care in the general population (Andrade et al., 2014). Similarly, many participants responded to the financial vignette with suggestions of tapping into savings in order to relieve financial worries – an option that may not be available to many individuals, especially those in the midst of financial struggles. Until results can be replicated with a more diverse sample, the benefits of this process for individuals with limited resources remain questionable.

Next, assumptions were made about participants' levels of situational literacy that may not have represented their actual literacy. Situation literacy refers to having knowledge and practical skills associated with a particular situation. Based on findings in the literature, males were expected to have greater financial literacy than females (Driva et al., 2016), whereas females were expected to be more knowledgeable about depression than males (Swami, 2012). However, given that recruitment occurred from a university psychology participant pool, it is possible that depression literacy was greater for males than it would be in the general population. Although familiarity with each problem situation was assessed in this study, it is conceptually different from literacy. For this study, familiarity measured personal experience with a situation rather than the development of any skills relevant to managing the situation. In contrast, situation literacy involves knowledge and skills applicable to a given situation, and therefore is

likely to aid in a task like generating alternatives for managing a situation. Assessment of situational literacy would complement measures of familiarity in future studies.

Third, situation vignettes are inherently limited in their ability to act as analogues for personal experience. Similar to real-life conditions, the vignettes developed for this study were ill-structured, in that they did not provide exhaustive detail of the situation, nor did they aim to guide participants toward best solutions. They were intended to be vague enough to allow participants to relate to the situation and fill in any missing information as they saw fit. However, situations encountered in daily life are surrounded by a wealth of additional information, some of which is applicable and some of which is irrelevant to that particular situation. Vignettes that attempt to capture this complexity by including additional, and perhaps irrelevant, details risk becoming too specific to generalize to the readers own experience. Furthermore, for the purposes of generating alternatives, it is assumed that the process of sifting through this information has already been completed in a prior stage of problem definition (Nezu et al., 2013). Although this study provided a variation in information provided through use of problem labeling, future research could explore the effects of a broader variety of vignette information.

Finally, generalizing from the measure of quantity of good alternatives should be done with caution. Alternatives were rated according to how effective they might be at managing the problem situation while mitigating any undesirable or harmful consequences. This process allowed a certain level of subjectivity into the rating system. For example, illegal activities (e.g. selling/using illegal drugs, robbery, assault, etc.) received a rating of zero due to the potential for consequences deemed by this author to be exceptionally undesirable, such as time in prison or legal issues that could be expected

to compound any pre-existing financial or mental health problems. However, there are individuals who may consider the reward worth the risk and would rate certain options accordingly. Although efforts were taken to operationalize the quality rating scale, utilization of a single rater increased the likelihood of values-based subjectivity that limit comparability with other studies.

Implications and Future Directions

Results of this study have several implications regarding future study and clinical practice. The primary clinical implication is the potential utility of depression as a target problem in PST or other psychotherapeutic techniques in which problem solving is utilized. Participants in this study were able to generate at least as many good options for managing depression as they could for managing financial struggles. If this process had occurred in the context of PST, the therapist could have worked with the client to use the alternatives generated to prompt for additional alternatives or develop greater alternative specificity, further increasing the quantity and quality generated (Nezu et al., 2013). Even without additional generation, the alternatives generated during this study produced a large proportion of potentially helpful approaches for managing depression that could be harnessed during a decision making process to select and implement the most effective approach.

The next implication is that fluency abilities, particularly ideation fluency, were the greatest predictors of alternatives generation. This suggests that development of these abilities would better facilitate alternatives generation. Several strategies for improving generation fluency that have developed from brainstorming research are noted in the literature review (e.g. Meadow, Parnes, & Reese, 1959). These include the quantity

principle (e.g. generating a greater quantity will yield more quality alternatives), deferment of judgment (e.g. produce all generated alternatives without inhibition or censorship – evaluation comes later), and seeking variety (e.g. seek unique categories of alternatives, rather than focusing on generating from a single category of alternatives).

Perhaps the most important avenue for future research is investigating whether improved generation of alternatives for depression results in improved management of depressive symptoms. Based on the problem-solving framework developed by Nezu et al., (2013), effective alternatives generation should facilitate subsequent problem solving steps, resulting in implementation of effective strategies for managing depression. Investigation of other problem solving skills (e.g. problem definition, decision making, solution implementation) using depression as the problem situation would provide further evidence as to the efficacy of using depression as the target problem in PST.

Conclusion

The purpose of this study was to evaluate the process of generating alternative solutions for depression. This was achieved using two avenues of exploration: first, through examination of relationships between alternatives generation for depression and variables identified by the literature as being associated with this ability; second, through group comparisons between factors that were expected to influence alternatives generation.

As expected, alternatives generation had a strong, positive relationship with ideation fluency and lesser associations to measures of verbal fluency. Relationships to other variables of interest were weak or non-significant, possibly affected by design

characteristics. Nonetheless, the strong relationship with measures of fluency suggests that development of fluency ability can facilitate improved generation of alternatives.

Group comparisons indicated that problem labeling can affect alternatives generation, depending on situational factors such as the nature of the problem and gender of the person experiencing the problem. Female participants were more proficient than males at generating alternatives, regardless of the situation. Males generated a better quantity of good alternatives for the depression vignette than they did for the financial vignette.

Overall, results suggested that depression may be a viable target for alternatives generation within a problem-solving framework. This was a promising first step toward validating the utility of depression as the target problem situation in a broader problem-solving context. Further study is recommended to explore ways to improve generation fluency, evaluate use of depression as the situation in other stages of a planful problem solving approach, and determine the effectiveness of this targeted approach for managing depressive symptoms.

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